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An exploration of the factors that influence the adoption of healthy lifestyles among Saudis living with Cardiovascular Disease (CVD)

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Thesis presented in fulfilment of the requirement of the degree of Doctor of Philosophy

The University of Edinburgh

Declaration

I hereby declare that this thesis has been composed solely by myself and that the work has not been submitted, in whole or parts, towards any other degree or professional qualification. I confirm that the work presented is entirely my own, except where stated otherwise by reference or acknowledgment.

Afnan Tunsi

Preface

This thesis is submitted for the degree of Doctor of Philosophy in Nursing Studies at the University of Edinburgh. The purpose of this research is to explore the factors that influence Saudis' decisions to adopt and maintain healthy lifestyle after CVD events. The study makes contribution to knowledge by demonstrating that raising individuals' awareness of the need for a healthy lifestyle might not be sufficient for behavioural change unless sociocultural and contextual issues are considered. Understanding the influence of the sociocultural and environmental factors that this study has unveiled is fundamental to developing effective interventions and resolving the underlying structures and mechanisms that shape behaviour change. A conceptual model was developed from the study findings, which conceptualises a dynamic interplay between religious beliefs, family values, sociocultural norms, insufficient healthcare services, physical environment and policy regulations as the factors associated with Saudis' lifestyle behaviour and in doing so outlines the study's unique contribution to knowledge. In addition, implications for practice, research and policy recommendations for intervention development were suggested to tackle the rise in burden of cardiovascular diseases (CVDs).

Abstract

Cardiovascular Disease (CVD) remains the leading cause of death and disability-adjusted life worldwide. It has reached overwhelming proportions in many countries around the world, and Saudi Arabia is no exception. Lifestyle interventions are an essential element in the prevention of CVD. However, promoting healthy lifestyle is very challenging because a multitude of factors, including beliefs, social norms, cultural values and environmental factors interact and influence people's decisions to adopt and maintain healthy lifestyles. The effects of these factors on cardiac patients in the context of Saudi Arabia are largely unknown. To address this gap, this study employed a qualitative design utilising in-depth individual interviews to explore the barriers to and facilitators of the adoption of healthy lifestyles among Saudis living with CVD. Thirteen male and eight female participants from two major hospitals in Jeddah, Saudi Arabia were interviewed. The study used the Framework analysis guided by the work of Ritchie and Spencer to analyse the transcripts. The social ecological model of health promotion provided a theoretical lens through which multiple levels of influential factors were examined from the perspective of CVD patients themselves. Analysis of the data revealed that lifestyle choices are characterised by multiple embedded meanings attached to participants' lives and reflecting family, religious and cultural values. However, the dominant barrier to the adoption of healthy lifestyle was attributed primarily to constraints imposed by the established cultural and social norms. Other factors include religious beliefs, family values, insufficient healthcare services, physical environment and lack of policy regulations. Thus, while individuals may report having the ability and intention to change, any changes they make are largely shaped by the social and cultural norms in which they are embedded. The findings highlight that educating people on the need for a healthy lifestyle might not be effective unless their individual and contextual issues are considered. This study supports the need for developing comprehensive lifestyle interventions that take account of the complex array

of the contextual factors that shape behaviour change to promote the engagement and maintenance of healthy lifestyle among Saudi patients living with CVD. The findings of this study may be used to inform population-based strategies, to integrate these into regional prevention frameworks, and to then translate these into locally delivered healthcare services.

Lay summary

Cardiovascular Disease (CVD) remains the leading cause of death and disability-adjusted life worldwide. It has reached overwhelming proportions in many countries around the world, and Saudi Arabia is no exception. Lifestyle interventions are an essential element in the prevention of CVD. Promoting healthy lifestyle is however very challenging because multiple factors influence people's decisions to adopt and maintain healthy lifestyles. Understanding these factors is essential to developing comprehensive lifestyle intervention to tackle the rising burden of CVD.

This qualitative study explores the barriers to and facilitators of the adoption of healthy lifestyles among Saudis living with CVD through the constructs of the social ecological model of health promotion. The study shows that there are multiple individual, social and environmental factors that influence a person's decisions with regard to health. The study found that lifestyle choices among Saudis living with CVD are largely influenced by constraints imposed by the established cultural and social norms. Other factors include religious beliefs, family values, insufficient healthcare services, physical environment and lack of policy regulations.

The study suggests that educating people on the need for a healthy lifestyle might not be effective unless their individual and contextual issues are considered. The study further recommends that the health promotion strategies in Saudi Arabia adopt individual, community, and policy level interventions to address the burden of CVD.

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List of abbreviations

ACCF: American College of Cardiology Foundation

AHA: American Heart Association

AMI: Acute Myocardial Infarction

BCTs: Behaviour Change Techniques

BME: Black and Minority Ethnic groups

BMI: Body Mass Index

CHD: Coronary Heart Disease

CR: Cardiac Rehabilitation

DASH: Dietary Approaches to Stop Hypertension

FCTC: Framework Convention on Tobacco Control

GDP: Gross Domestic Product

G20: Group of Twenty of countries with major economies

HBM: Health Belief Model

HF: Heart failure

KAUH: King Abdulaziz University Hospital

KFAFH: King Fahad Armed Forces Hospital

MD: Mediterranean Diet

MENA: Middle East and North Africa

METs: Metabolic Equivalents

MI: Myocardial Infarction

MOH: Ministry of Health

PBUH: Peace Be Upon Him

PCI: Percutaneous Coronary Intervention

RTAs: Road Traffic Accidents

RoI: Return on Investment

SAR: Saudi Arabian Riyals

SDGs: Sustainable Development Goals

TPB: Theory of Planned Behaviour

TRA: Theory of Reasoned Action

UHC: Universal Health Coverage

USA: United States of America

Glossary

Allah: the name of God the almighty in Arabic.

Cardiovascular disease (CVD): is a broad category of conditions including acute rheumatic fever, chronic rheumatic heart disease, hypertensive heart disease, coronary heart disease, pulmonary heart disease, congestive heart failure, and any other heart condition or disease (WHO, 2015)

Coronary Heart Disease (CHD): is the collective term for diseases that occur when the walls of the coronary arteries become narrowed by a gradual build-up of fatty material called atheroma. The two main forms of CHD are myocardial infarction and angina. (British Heart Foundation, 2012).

Eid: is an important religious holiday celebrated by Muslims worldwide that marks the end of Ramadan, the Islamic holy month of fasting

Holy Quran: the holy book of Islam; the highest and most authentic authority in Islam.

Lifestyle interventions: are any intervention that includes smoking cessation, physical activity, heart healthy diet, weight reduction and maintenance, cardiac rehabilitation and consumption of Omega 3 fatty acids (Mosca et al., 2011).

Prophet: The Prophet Mohammad is the messenger of God. Any reference to the Prophet is followed by the phrase “Peace be upon him”.

Sharia: the body of Islamic law based on Quran and Sunnah.

Shisha: is a waterpipe in which a mixture of tobacco and flavourings or molasses sugar is smoked. The tobacco is heated beneath charcoal, the heat pushes the smoke into a water container where it bubbles through and then leaves the water container via a hose and inhaled

Sunnah: Practices undertaken or approved by the Prophet PBUH and established as legally binding precedents

Chapter 1 – Introduction

1.1 Introduction

The global epidemic of cardiovascular disease (CVD) represents a major public health challenge and accounts for almost 30% of all deaths worldwide (Roth *et al.*, 2017). Although CVD mortality has declined in many high-income countries, it nevertheless accounts for almost half of all deaths (WHO, 2017c). The global interest in an effort to tackle non-communicable diseases (NCDs) including CVD has succedded in reducing mortality, yet further action is required to reduce morbidity and the burden of these diseases (WHO, 2015). The situation is increasingly alarming as over the last decade mortality rates have declined in many high-income countries and increased in low to middle-income ones, leading to growing inequalities with regard to CVD care (Roth *et al.*, 2017).

In common with other rapidly developing countries, the burden of disease in Saudi Arabia had shifted from communicable to NCDs, a move which created challenges for patients, families and the healthcare system today (Ahmed *et al.*, 2017). In Saudi Arabia, NCDs lead to approximately 73% of total deaths, with CVD accounting for 37% of this figure (WHO, 2018a). There is high exposure to risk factors that will contribute to the future increase in incidence of NCDs, which are continuing to rise. The most predominant CVD risk factors include diabetes mellitus, hypertension, smoking, sedentary lifestyle, and obesity (Al-Nozha *et al.*, 2005; Al-Nozha *et al.*, 2007a; Bassiony, 2009; Alavudeen *et al.*, 2013; Basulaiman *et al.*, 2014; Ahmed *et al.*, 2017; Alotaibi *et al.*, 2017). Factors identified as driving this trend are rapid unplanned urbanisation, economic growth, and changes in dietary and lifestyle habits (Memish *et al.*, 2014b; Alkhalaf, 2017).

In line with the challenges posed by the rising epidemic of CVD, there is a dire need for collective action aimed at health promotion interventions. There is strong evidence that investments in NCDs prevention and control can have significant health, economic and development benefits, and provide excellent value for money, which is collectively known as return on investment (RoI) (United Nations, 2017a). The 2030 Agenda for Sustainable Development Goals (SDGs) adopted at the United Nations Summit in 2015 recognised NCDs as a major health issue that the Millennium Development Goals did not address. As part of the agenda, NCDs were included as a specific SDG target that calls for one third reduction in premature mortality from NCDs by 2030 with specific focus on CVD (WHO, 2015). The resolution proposed a roadmap for accelerating the work needed to overcome the global impact of NCDs by developing a global action plan for the prevention and control of NCDs 2013-2020. Achieving this target require major interventions that emphasise prevention and treatment access for all (Ralston *et al.*, 2016; Bennett *et al.*, 2018). Prevention initiatives, such as the adoption of healthy lifestyle habits and adherence to prescribed medications, offer an evidence based approach, proven to reduce CVD mortality and morbidity (Smith *et al.*, 2011; Nichols *et al.*, 2014; Brinks *et al.*, 2017). Despite the compelling evidence about the health benefits of making lifestyle changes for people with CVD, recommendations have not yet been fully translated into improved clinical outcomes, as only 50% of individuals globally adhere to such recommendations (WHO, 2013).

A healthy lifestyle, being a multifaceted process, is influenced by various factors including social norms, cultural values and beliefs, and socio-economic constraints. These factors can influence a person's behaviour and his/her compliance in following a healthy lifestyle (Haskell, 2003; Mosca *et al.*, 2011; de Waure *et al.*, 2013). The effects of these factors in the context of a Saudi population living with CVD are largely unknown and warrant further research.

Thus, there is a pressing need to better understand how Saudis engage with secondary prevention behaviours after a cardiac event, particularly with making lifestyle changes, which in turn should reduce incidents and levels of mortality associated with CVD. This understanding is fundamental for developing major contextual based interventions and policies that meet the population needs and are relevant to the Saudi society. This introductory chapter presents the aims and objectives for the present study and highlights the structure of the thesis, together with the focus of each chapter.

1.2 Aims and objectives of the study

Previous studies of CVD in Saudi Arabia have investigated the prevalence and the risk factors of the disease (Saquib *et al.*, 2017). Yet, research on the barriers to and facilitators of the adoption of healthy lifestyles among Saudis with established CVD has been rather limited; thereby leaving a significant research gap that requires further study. In addition, although there are practice guidelines for health conditions, such as hypertension and diabetes in Saudi Arabia (Saudi Hypertension Management Society, 2018), there are no culturally specific practice guidelines designed for Saudi heart patients that address the unique cultural and social circumstances for Saudis (Saudi Heart Association, 2018). Instead, existing international guidelines from the American Heart Association (AHA) and the European Society of Cardiology (ESC) provide the basis for Saudi practice (Ministry of Health, 2014b). Therefore, the aim of this study was to generate an in-depth understanding of the factors that influence the adoption of healthy lifestyles among Saudis after CVD diagnosis. This understanding is crucial to design contextually based preventive interventions targeted at this population.

The study explores the individual and contextual factors such as values, beliefs, culture and environments that affect the decisions of Saudis living with CVD to make lifestyle changes through the lens of the social ecological model (McLeroy et al., 1988). More attention is given to behavioural and ecological models and frameworks that consider the contextual influence on health behaviour amid other influences (Linke, Robinson and Pekmezi, 2014). It has been argued that examining health behaviours at multiple levels of influence prevent researchers from focusing on a single aspect of influence, and thus providing a thorough picture of the relations between different levels of influence (Sallis, Owen and Fisher, 2008; Richard, Gauvin and Raine, 2011). This specific feature offers the rationale for selecting the social ecological approach of McLeroy et al. (1988) as a theoretical lens for this study. Using the social ecological model as a framework in this study offered an important advantage over other psychosocial models and theories that primarily focus on individual level factors. This in-depth exploration also helped in gaining suggestions from patients about how their holistic care might be improved and identified their unmet needs to make lifestyle changes. It is expected that the findings of this study will not only provide an understanding of the factors that influence lifestyle behaviours of Saudis, but also can be critical in guiding the development of contextual based intervention strategies to promote the adoption of healthy lifestyles, and thus reduce the mortality and morbidity caused by CVD in Saudi Arabia.

1.3 Structure of the thesis

This thesis consists of eight chapters: i) Introduction, ii) Background, iii) Literature Review, iv) Theoretical Framework, v) Methodology, vi) Findings, vii) Discussion, and viii) Implication and Conclusion. This introductory chapter briefly articulates the research aims and objectives.

The second chapter is the **Background** chapter and is divided in two parts; the first part introduces the global interests in NCDs and provides an overview of the global epidemiology and risk factors of CVD in addition to the current secondary prevention strategies. The second part reviews the unique cultural and social structure of Saudi Arabia and analyses the Saudi healthcare system with specific emphasis on the current prevention strategies with the aim of introducing the importance of the study within the Saudi context.

The third chapter is the **Literature Review** chapter. This chapter provides a critical analysis and synthesis of the literature exploring the factors influencing the adoption of healthy lifestyles from a global view and identifies gaps in research. The critical literature review indicates that CVD patients face individual, sociocultural and environmental challenges that hinder their abilities to engage or sustain changes to their lifestyles after cardiac events.

The fourth chapter is the **Theoretical Framework** chapter. It reviews and critiques the most relevant health behaviour theories and models and their key concepts, with particular focus on how they relate to lifestyle behaviours. This is followed by a critical review of the use of the social ecological model (McLeroy *et al*., 1988) in the area of lifestyle change along with a justification of the selection of this model as the theoretical basis for the present study.

The fifth chapter is the **Methods** chapter, which outlines the chosen methods with a justification for each choice. It starts with reflections on the formulation of the research aims and objectives then goes on to describe the research philosophy that underpins the adoption of qualitative methodology based on the theoretical perspective of the social ecological approach. Justification for using in-depth interviews as a data generation method along with sampling

techniques is provided followed by a detailed explanation of the process of analysis. Lastly, the ethics of the study as well as strategies to enhance the rigour of the study are considered.

The sixth chapter is the **Findings**, which portrays Saudi patients' experiences of the factors that promote or hinder their ability to handle lifestyle changes. These factors are further conceptualised under six major themes and each main theme is comprised of a number of sub-themes can be, depending upon the context, classified as either barriers to or facilitators of lifestyle change or both, and illustrated by data presented in quotations from the interview data.

The seventh chapter is the **Discussion** chapter and it constructs a detailed interpretation of the emergent themes from the findings through the lens of the social ecological model and considered within the context of existing literature. According to McLeroy's social ecological model of health promotion (McLeroy et al., 1988), the study findings are categorised and discussed under five levels: intrapersonal, interpersonal, institutional, community and public policy factors.

The eighth chapter is the **Implications and Conclusions** chapter and it summarises the key conclusions of the study, followed by a presentation of the conceptual model developed from the findings which outlines the study's unique contribution to knowledge. In addition, implications for practice, research and policy are discussed and recommendations for health promotion interventions are suggested at the individual, community and policy levels. Finally, the study limitations and concluding points are disclosed.

Chapter 2 - Background

2.1 Introduction

This chapter is divided into two parts. The first part reviews the global epidemiological transitions of CVD, the current preventive practices and the impact of lifestyle interventions on CVD risk. The second part provides an overview of the Saudi religious, social and cultural contexts. A review of the major risk factors of CVD in Saudi Arabia is then presented along with a critical analysis of the healthcare system and available preventive services to tackle the rising risk of CVD in the country.

2.2 Part I: Cardiovascular disease (CVD): A global alarm

2.2.1 Global epidemiology of CVD

Cardiovascular disease (CVD) is a group of disorders of the heart and blood vessels including cerebrovascular disease, coronary heart disease, peripheral arterial disease, rheumatic heart disease, deep vein thrombosis and pulmonary embolism (WHO, 2017a). CVD is the leading cause of morbidity and a major barrier to sustainable human development across the globe (WHO, 2017c; Benjamin *et al.*, 2018). CVD accounts for more than 17.9 million deaths globally, of which 85% are due to ischemic heart disease and stroke, a number that is expected to grow to more than 23.6 million by 2030, unless effective interventions are taken (WHO, 2017a; Roth *et al.*, 2017).

Premature mortality due to CVD declined globally by 15% between 2000 and 2012 (Lozano *et al.*, 2013). This decrease in mortality was driven by population-level blood pressure control, advances in treatment and declines in

tobacco use. Declines in mortality have been greater in advanced industrialised and high-income countries than low- and middle-income countries leading to growing inequalities with regard to CVD care (Benjamin *et al.*, 2017). However, according to the Global Burden of Disease study, the trends of CVD mortality have plateaued and are no longer declining for developed countries and countries with high-income (Roth et al., 2017). Such an alarming finding demonstrates the importance of increasing investment in the prevention and treatment of CVD and NCDs worldwide. In line with this, the 2030 Agenda for Sustainable Development Goals (SDGs) adopted at the United Nations Summit on Sustainable Development in September 2015 recognised NCDs as a major challenge for sustainable development and were included as a specific SDG target 3.4 that calls for one third reduction in premature mortality from NCDs by 2030 (WHO, 2015). Other NCD-related targets include improvements in tobacco control; reduction in the harmful use of alcohol; supporting research and development of vaccines and medicines for NCDs; and achieving Universal Health Coverage (UHC) (WHO, 2015). Achieving these SDGs targets will require major interventions to tackle the challenge particularly with the increase in ageing population and rapid urbanisation and globalisation of markets that promote unhealthy diets and physical inactivity (Ralston *et al.*, 2016; Bennett *et al.*, 2018). The WHO Global Action Plan for the Prevention and Control of NCDs 2013-2020 included a roadmap of commitments made by governments and provided a strategic guidance on how countries can develop and implement strong national plans incorporating the role of government, community initiatives and individuals, and emphasise prevention and treatment access for all (Ralston *et al.*, 2016; Bennett *et al.*, 2018).

2.2.2 CVD risk factors

Cardiovascular risk factors are divided into two major groups; modifiable and

non-modifiable risk factors. Modifiable risk factors refer to factors that can be changed, which include: smoking, physical inactivity, hypertension, hypercholesterolemia, diabetes mellitus and obesity (Filion and Luepker, 2013; WHO, 2017a). Non-modifiable risk factors, on the other hand, are those that were inherited and include age, gender, socio-economic status, and family history of heart disease (WHO, 2017a). Yusuf, Hawken and Ounpuu (2004) conducted a large-scale INTERHEART global case control study in 52 countries throughout Asia, Europe, the Middle East, Africa, Australia, and North and South America. The study identified nine modifiable risk factors for CVD: current smoking, diet, diabetes, hypertension, obesity, stress, exercise, alcohol, and high blood lipid levels. Collectively, these nine modifiable risks are the major contributors to cardiovascular mortality and morbidity and account for about 90% of the attributable risk in men and 94% in women (Yusuf, Hawken and Ounpuu, 2004). These risks are even higher for people who live in low-income and middle-income countries because of the unstable market economies, lack of education, and poor general infrastructure, including healthcare systems (Fuster, 2010b). The adoption of healthy lifestyle habits and adherence to prescribed medications, offer an evidence-based approach to reduce cardiac mortality and morbidity by reducing these modifiable risk factors (Smith *et al.*, 2011; Nichols *et al.*, 2014; Brinks *et al.*, 2017). The American Heart Association (AHA) and the American College of Cardiology Foundation (AHA/ACCF) published an update to the secondary prevention and risk reduction practice guidelines for patients with CVD, with a view to reducing the risk of recurrent cardiovascular events including pharmacotherapies, lifestyle interventions, cardiac rehabilitations and managing psychosocial factors (Smith *et al.*, 2011). Although these guidelines are 7 years old, they are the latest AHA/ACCF published guidelines on the secondary prevention of CVD available now. A recent AHA/ACCF guideline update was published this year, but was related to the primary prevention of CVD only (Arnett *et al.*, 2019).

2.2.3 Current practice in secondary prevention of CVD

Given the high burden of CVD risk factors worldwide, there has been a move globally toward primary and secondary prevention strategies to reduce the prevalence of those risk factors and subsequent alleviation of CVD mortality (Balady *et al.*, 2011; Smith *et al.*, 2011; Dehghan *et al.*, 2012; Kohli, 2015; Mathews *et al.*, 2015). Primary prevention strategies are aimed at preventing CVD before it occurs, whereas secondary prevention interventions aim at decreasing the recurrence of disease once CVD has been diagnosed (Pearson *et al.*, 2002). Secondary prevention is acknowledged as an effective intervention to reduce levels of CVD. Guidelines for secondary prevention outline strategies for optimal medical therapy, lifestyle modification and cardiac rehabilitation (Smith *et al.*, 2011; Bansilal, Castellano and Fuster, 2015). Although scientific evidence supports guidelines-based pharmacotherapies for achieving cardiovascular risk reduction, adjunctive lifestyle modification in the setting of established CVD is arguably of equal importance in reducing the risk of recurrent cardiovascular events (Iestra *et al.*, 2005; de Waure *et al.*, 2013; Booth *et al.*, 2014b; Brinks *et al.*, 2017). Recommendations for lifestyle modifications include consuming healthy diet, physical activity, smoking cessation, moderate alcohol consumption and management of psychosocial factors (Smith *et al.*, 2011; Anderson, 2012).

2.2.3.1 Pharmacotherapies and secondary prevention of CVD

Research has provided evidence of the effectiveness of adherence to prescribed pharmacotherapies for reducing the risk of recurrent cardiovascular events in patients with CVD (Stafford, Monti and Ma, 2005; Cooper and O'Flynn, 2008; Biondi-Zoccai and Landoni, 2011; Lahoud *et al.*, 2011; De Caterina *et al.*, 2012; Mathews *et al.*, 2015; Smith, 2016) According to the AHA/ACCF guidelines, using aspirin, beta-blockers, angiotensin

converting enzyme inhibitors (ACEI), lipid lowering drugs, anti-hypertensive drugs and anti-thrombolytic therapy is recommended for all post myocardial infarction (MI) patients to reduce their risk of recurrent CVD (Perk *et al.*, 2012; O'gara *et al.*, 2013; Özdemir *et al.*, 2013; Hara *et al.*, 2014; Smith, 2016; Wiysonge *et al.*, 2017). It has been reported that using these medications collectively is strongly associated with reducing the chance of mortality by six months and subsequent two years survival in patients with acute coronary syndromes as compared to non-adherent patients (Mukherjee *et al.*, 2004; Lahoud *et al.*, 2011). Although the established evidence that the use of cardioprotective pharmacotherapies favourably affects the mortality and morbidity associated with CVD, long-term non-adherence to treatment remains, and is associated with a broad range of adverse outcomes in patients with CVD (Ho *et al.*, 2008; Dempe *et al.*, 2013). A recent study reported that almost one third of patients has stopped taking their cardioprotective medications at their six months follow-up (Mathews *et al.*, 2015). This finding suggests that medication non-adherence to prescribed medications should be targeted in interventions for patients with CVD to maximise their outcomes.

2.2.3.2 Lifestyle modification and the secondary prevention of CVD

Although cardioprotective medications play an integral role in optimising secondary prevention outcomes of CVD, adopting healthier lifestyle behaviours is found to be complimentary in this regard (Iestra *et al.*, 2005; de Waure *et al.*, 2013; Booth *et al.*, 2014b; Brinks *et al.*, 2017). The key component of this approach requires patients to adopt healthy lifestyle habits and cease harmful ones, in order for them to reduce levels of coronary risk. This approach confers benefits both as a preventive measure for healthy individuals and as a strategy to reduce the risk of a further cardiac event in those with established CVD (Kohli, 2015). Contemporary guidelines for

coronary patients outlined by the AHA and the ACCF identify “lifestyle modification” as a Class 1B recommendation for blood pressure control, physical activity, and lipid/lipoprotein control and weight management (Smith et al., 2011). Accordingly, post MI patients who reported adherence to just 3 healthy lifestyle habits (smoking cessation, physical activity and healthy eating) for one month after hospital discharge, demonstrated a 3.8 fold reduced risk of death, recurrent attacks and stroke after 6 months as compared with those MI patients who adhered to none of these behaviours (Chow *et al.*, 2010). Likewise, a systematic review and meta-analysis of randomised control trials demonstrated that multifactorial lifestyle interventions significantly reduce the risk for fatal cardiovascular events by 18% in patients with established coronary heart disease (CHD), both symptomatic and asymptomatic. Further a non-significant reduction of non-fatal CHD events, overall mortality and hospital readmissions was also found (de Waure *et al.*, 2013). Lifestyle modification strategies include smoking cessation, regular exercise and consumption of a healthy diet (Smith et al., 2011).

2.2.4 Smoking cessation

The relationship between smoking and CVD is apparent; it is the major modifiable health risk in today’s world (Frey *et al.*, 2011; Filion and Luepker, 2013; Courtney, 2015; Benjamin *et al.*, 2018). According to the 2017 WHO report on the global tobacco epidemic, 100 million individuals died worldwide during the 20th century due to diseases related to tobacco use. Furthermore, it is projected that by the year 2030, one in six individuals will die due to the deadly effects of smoking (WHO, 2017d). With regards to CVD, one study found that smoking cessation among 18,885 CVD patients was associated with more than a double reduction in the death rates (Frey *et al.*, 2011). A randomised controlled trial examining the association of smoking status with

clinical outcomes of CHD patients (n=1,800) undergoing revascularisation at five-years follow-up, found that smokers had worse clinical outcomes due to a higher incidence of recurrent MI, than those who never smoked (Zhang *et al.*, 2015). Although there is compelling evidence that smoking and exposure to second-hand smoke contribute to initial and recurrent cardiovascular events (Buchanan *et al.*, 2015), many patients continued smoking and their smoking habits varied considerably (Benowitz and Prochaska, 2013). A meta-analysis of 14 studies showed that the rate of persistent smoking following a diagnosis of CHD ranged from 7% to 63% (Zhang *et al.*, 2015).

Smoking cessation interventions in secondary prevention include both pharmacological and behavioural approaches (Brinks *et al*., 2017). Smoking cessation medications include nicotine inhalers, patches and gum; whereas behavioural approaches include self-help materials, physician and nursing counselling, smoking cessation clinics or telephone support (Brinks *et al*., 2017). A systematic review of 40 randomised controlled clinical trials of behavioural intervention for smoking cessation in patients with CHD found a positive effect on abstinence at 6 and 12 months (Barth *et al.*, 2015). To assess the effect of combining pharmacotherapy and behavioural approaches on smoking cessation, Stead et al. (2016) conducted a systematic review of 41 randomised controlled trials and found that combining both approaches was superior to the usual care group. Such evidence further supports the need for smoking cessation interventions in secondary prevention approaches to CVD.

2.2.5 Consuming healthy diet

The consumption of saturated fats and trans-fatty acids has been strongly associated with the increased incidence of cardiovascular disease (Anderson

and Appel, 2006; Hooper *et al.*, 2011; Dehghan *et al.*, 2012; Salehi-Abargouei *et al.*, 2013; Siervo *et al.*, 2015). Therefore, maintaining a healthy diet is a cornerstone in the primary and secondary prevention of CVD. As demonstrated in a large cohort study of high risk patients with existing CVD or diabetes, a healthy diet consisting of high amounts of whole grains, nuts, fruits and vegetable was associated with a 20% reduction in the risk of recurrent cardiovascular events as compared with a diet high in fat and cholesterol (Dehghan *et al*., 2012). Likewise, a study of post MI patients in the United States (US) found that a high quality diet rich in fruits and vegetables and low in fats and cholesterol was associated with a lower risk of all mortality (Li *et al.*, 2013). Further, increasing evidence suggests that heart healthy nutrition can significantly reduce cardiovascular risk not only by modifying lipids, body weight and insulin resistance (Iestra *et al.*, 2005; Kadda *et al.*, 2015), but by reducing inflammation as well (Giugliano, Ceriello and Esposito, 2006).

Historically, research on dietary modification to reduce CVD risk focused on individual components and food groups including fish, fruits and vegetables (Brinks *et al.,* 2017). However, more recently the focus has shifted to emphasise the influence of dietary patterns rather than components; particularly Dietary Approaches to Stop Hypertension (DASH) and the Mediterranean Diet (MD). The DASH diet can significantly decrease blood pressure and reduce the risk of developing CVD (Conlin *et al.*, 2003; Fung *et al.*, 2008; Salehi-Abargouei *et al.*, 2013; Siervo *et al.*, 2015). A meta-analysis of cohort studies evaluating the effects of the DASH diet on CVD found a 21% reduced risk of coronary artery disease and 21% reduced risk of stroke (Salehi-Abargouei *et al.*, 2013). The diet consisting primarily of vegetables, fruits, lean meat, fish and low fat dairy, is low in sodium, cholesterol and fat. The MD diet is an alternative dietary approach that is rich in fruits, vegetables, grains, protein, moderate intake of olive oil and red wine, but with a limited intake of meat, dairy and sweets (Bach-Faig *et al.*, 2011; Huhn *et al.*, 2015;

Nissensohn *et al.*, 2016). Adherence to MD has been suggested to have favourable impact on blood pressure (Nordmann *et al.*, 2011; Nissensohn *et al.*, 2016), blood lipids and weight management (Nordmann *et al.*, 2011; Mertens *et al.*, 2014) as well as reported improvement in the reduction of coronary risk factors (Kadda *et al.*, 2015) and lowering the incidence levels of major cardiovascular events by 30% (Estruch Riba *et al.*, 2013).

To assess the effects of MD in secondary prevention, Iestra (2006) noted improved prognosis for post MI patients who were compliant with MD diet along with moderate alcohol, regular to moderate physical activity and non-smoking behaviour (Iestra *et al.*, 2006). A more recent meta-analysis of 17 studies on evidence of the association between MD adherence and CVD incidence and mortality revealed lower risks of CVD incidence and mortality, including CHD and MI (Marventano *et al.*, 2015). Based on this evidence, it would be suggested that dietary modification has a profound effect on the secondary prevention of CVD and has to be addressed soon after hospital discharge of the patient.

2.2.6 Physical activity

Physical activity is an important health-related determinant. Engagement in structured aerobic exercise or increasing lifestyle physical activity is associated with reduced coronary risk factor profile. Such a profile is signified by a lower blood pressure, improved insulin sensitivity and lipid profiles and reduced total body fat (American College of Sport Medicine, 2009; Goel *et al.*, 2011; Smith *et al.*, 2011). A systematic review of 3 meta-analyses, 10 randomised controlled trials, and 9 cohort studies conducted by Iestra et al. (2005) estimated regular physical activity to be associated with 25% mortality risk reduction in CVD patients. Further, improved cardiorespiratory fitness

(CRF), achieved through physical activity, has been consistently associated with reduced cardiovascular mortality and a lower risk level of experiencing recurrent MI (Hung *et al.*, 2014). Moreover, sedentary lifestyle behaviours, such as prolonged sitting, was found to be associated with metabolic derangements and an increased all-cause cardiovascular mortality (Biswas *et al.*, 2015).

Guideline recommendations for increased lifestyle physical activity in secondary prevention suggest engagement in moderately intense aerobic exercise for 30 to 60 minute for at least 5 days per week (Smith et al., 2011). Promoting patients to adopt such lifestyles involves many techniques such as motivational interviewing, fitness based technologies or patient physician collaborative communications (Bravata *et al.*, 2007; Brinks *et al.*, 2017).

2.2.7 Cardiac rehabilitation

Cardiac rehabilitation (CR) programmes are recognised as integral in optimising secondary prevention outcomes and accordingly, as with cardioprotective medications, are considered a Class 1A recommendation in the AHA/ACCF guidelines and by the European Society for Cardiology (Balady *et al.*, 2011; Smith *et al.*, 2011; Perk *et al.*, 2012; Piepoli *et al.*, 2016). Cardiac rehabilitation programmes usually consist of a personal assessment of the patients, advice on physical activity, training exercises, nutritional advice, lipids and blood pressure control, smoking cessation, weight management and psychosocial management (Piepoli *et al.*, 2010). One widely cited meta-analysis of 48 trials including 8,940 patients reported that exercise based cardiac rehabilitation was associated with reduced cardiovascular and all-cause mortality rates of 20% compared with usual care (Taylor *et al.*, 2004). More recent Cochrane systematic review and meta-analysis showed

greater reductions in systolic blood pressure, total cholesterol, triglyceride levels and self-reported smoking rates (Anderson *et al.*, 2016). Moreover, reductions in hospital admissions and improvement in quality of life were associated with cardiac rehabilitation (Anderson *et al.*, 2016), and the health benefits derived from the cardiac rehabilitation appeared to be largely maintained, at least over a 1-year follow-up (Gupta, Sanderson and Bittner, 2007; Balady *et al.*, 2011). Although exercise is the cornerstone of cardiac rehabilitation programmes, international guidelines consistently recommend the assessment for risk factor modification, education, lifestyle behaviour and psychosocial wellbeing to ensure provision of comprehensive care (Balady *et al*., 2011; Perk *et al*., 2012; Piepoli *et al.,* 2016).

Although these guidelines were supported with evidence (Leon *et al.*, 2005; Balady *et al.*, 2011; Mosca *et al.*, 2011; Smith *et al.*, 2011; Perk *et al.*, 2012; Anderson *et al.*, 2016; Schopfer and Forman, 2016), there is a significant gap between what is expected from published authorities, and the reality of clinical practice and adherence to cardiac rehabilitation remains suboptimal (Teo *et al.*, 2013). This gap may relate to a variety of barriers, such as a lack of awareness, attitudes, and a lack of expected outcomes (Teo *et al*., 2013; Anderson *et al*., 2016) highlighting the need to develop contextual based interventions that address these barriers to promote adherence to cardiac rehabilitation programmes and optimise patients' outcomes.

2.2.8 Conclusion

In summary, healthcare providers have a unique opportunity to provide comprehensive secondary prevention interventions to patients with established CVD. Accordingly, recommended guidelines for coronary patients include lifestyle modification strategies along with prescribed cardioprotective

pharmacotherapies that result in decreased one year mortality when incorporated into clinical practice (Smith *et al.*, 2011; O'Gara, 2013). Nonetheless, reported data regarding adherence to healthy lifestyle choices in secondary prevention are discouraging. Recent studies have shown that there is considerable room for improvement in secondary prevention efforts (Cortés-Beringola *et al.*, 2017). Changing lifestyle habits that have been developed and reinforced over a number of years is notoriously difficult and non-adherence by patients to recommended health behaviours is not a new phenomenon (Middleton, Anton and Perri, 2013). In a diverse cohort of 7,519 individuals with self-reported CHD or stroke histories, only 4.3% reported compliance with a healthy diet, smoking cessation and engagement in high levels of regular physical activity (Teo *et al*., 2013). Similarly, a considerable percentage of patients receiving percutaneous coronary intervention (PCI) for stable angina and not included in cardiac rehabilitation programmes do not achieve lifestyle and risk factor goals a year post their procedure, leaving them at increased risk of experiencing recurrent events (Khattab *et al.*, 2013).

Thus, understanding of the factors that may influence patients' inclination to adopt or reject lifestyle modification is paramount to address these barriers and to optimise their outcomes in secondary prevention and reduce future coronary risk. A critical review of the literature relating to the factors that impact lifestyle modification among CVD patients is presented in Chapter 3 (sections 3.4.1 – 3.4.6). The second part of this chapter will discuss the Saudi social, economic and healthcare contexts with special emphasis on the prevalence of CVD and its risk factors among Saudi men and women. Recognising the context and culture within people live is integral to understanding their beliefs, attitudes and abilities that implicitly influence their health behaviours and decisions, which is a cornerstone of public health policy and implementation (Edwards and Barker, 2014).

2.3 Part two: Overview of the Saudi context

2.3.1 Demography of Saudi Arabia

The Kingdom of Saudi Arabia lies at the furthermost part of South-Western Asia bordering the Persian Gulf and the Red Sea; and occupies about four-fifths of the Arab Peninsula with a total land area of around 200 million square kilometres (Central Intelligence Agency, 2018). The Kingdom consists of thirteen regions; Riyadh is the Kingdom's capital, Mecca and Medina are the holy cities, and Dammam and Jeddah are the economic cities (Figure 1) (Al-Rasheed, 2010). Latest population figures show that the Kingdom has reached a population of over 32 million, compared to 22 million in the year 2004, making it the largest Arab country in the Middle East and West Asia (General Authority for Statistics, 2017). Saudi citizens comprise around 68.9% of the total population; 57.58% are males and 42.41% females. A unique feature of the population is that young people predominate, with approximately 67.1% of the population under the age of 30 years; 37 % are below the age of 14 years and only 2.5% of the population are over 65 years of age with median age of the population is 21.6 years (General Authority for Statistics, 2017). According to the world population prospects report, the population of Saudi Arabia is expected to reach 39.8 million by the year 2025 and 54.7 million by 2050 (United Nations, 2017b). This is an expected outcome of the current high birth rate of 23.7 per 1000, and the increased life expectancy of 72.5 years for men compared to 74.7 years for women and declining mortality rate among infants (Ministry of Health, 2017). These improved statistics are mostly attributed to the cumplsory childhood vaccination programme that was implemented by the goverment in 1980 (Aldossary, While and Barriball, 2008; Almalki, Fitzgerald and Clark, 2011).

Figure 1 Map of the Kingdom of Saudi Arabia

2.3.2 Social and cultural contexts in Saudi Arabia

Society and culture are two key driving forces that influence and determine human thoughts and actions (Long, 2005). There are numerous societal elements such as social norms, traditions, gender roles, religious beliefs, and economic status that constantly shape the perceptions and behaviours of a particular community within a specific context (Emmons *et al.*, 2007). Such contextual elements not only lead to positive human actions, but in many cases can negatively influence individuals to engage in behaviours that are harmful both for the individuals and the society as a whole (Tompson, Lieberman and Falk, 2015). Therefore, a thorough understanding of the Saudi Arabian social and cultural contexts is necessary to fully explore the factors that promote or hinder the adoption of healthy lifestyles after CVD diagnosis. This understanding is vital in social research, particularly when connected to health and human behaviour, in order to realistically suggest recommendations based on the research findings (Edwards and Barker, 2014). Moreover, a sound knowledge of the sociocultural background of Saudi

Arabia depicted in this section of the thesis is helpful for readers to understand the research findings from the perspective of Saudi people, society and culture.

2.3.2.1 Faith and religion

Saudi Arabia was founded by King Abdulaziz bin Saud in 1932, and has since adopted the system of absolute monarchy (Al-Rasheed, 2010). It is the birthplace of Prophet Mohammed, peace be upon him (PBUH), and home to the holiest Muslim cities of Mecca and Medina. A pilgrimage to Mecca, or hajj, is a compulsory journey that all Muslims are required to make once in their lifetime (Hunt Janin, 2007). This makes Saudi Arabia a devoutly religious country, where the government bases its legitimacy and policies on the interpretation of Islamic law and principles (Central Intelligence Agency, 2018). In its expanse, Islam is the only religion that is practiced in the Kingdom and it permeates all aspects of living through the Sharia, which is a framework that contains a combination of the Holy Quran and Sunnah (Vassiliev, 2013a). Despite having a large expatriate community of various faiths in the Kingdom, most forms of public religious expressions, such as places of worship, are restricted. Therefore, in both rural and urban areas in Saudi Arabia, the Islamic rules are strongly enforced and dominate all aspects of daily life (Long, 2005). Social interaction, dietary patterns, relationships between family members, and treatment of people with different ages and genders are also guided by Islamic values. Alcoholic beverages for instance are strictly prohibited and there are limited leisure activities. Although the lifestyles and faith of rural and urban communities are very similar, rural Saudis are generally stricter than urban Saudis in following their traditions and community rules, and their lifestyles are derived and influenced by their tribal culture (Vassiliev, 2013a). These people prefer to lead nomadic lifestyles, live in the open deserts, carry on the rich oral poetic tradition and practice the traditional code of honour. However, because of the rapid Westernisation in

Saudi society, the number of rural residents is decreasing rapidly; yet there are still some people who still follow their ancestral life on caring for livestock, hunting and raiding (Khraif *et al.*, 2016). Moreover, Saudi Arabia uses the Islamic Hijri calendar to designate law, royal decrees and other government actions (Central Intelligence Agency, 2018). The Hijri calendar marks the migration of Prophet Mohammed (PBUH) from Mecca to Medina and is based on the lunar year which has 354 days, divided into twelve lunar months (Hunt Janin, 2007). Muslims everywhere use it to determine the correct days on which to observe the annual fasting in Ramadan, to attend Hajj, and to celebrate other Islamic holidays and festivals.

2.3.2.2 Value of the family

For Saudis, the family is the most important social institution and the primary basis of identity (Long 2005; Vassiliev, 2013). Families in Saudi Arabia, like families throughout the Middle East, tend to be patriarchal, where the father appears as an authoritarian figure at the top of a hierarchy based on age and sex (Moghadam, 2004). Families share a sense of corporate identity, and the esteem of the family is measured by the individual's capacity to live up to socially prescribed ideals of honour (Dhami and Sheikh, 2000). The values and practices inherent in families' ideals are adherent to Islamic values. Thereby families, and the entire society, value behaviours that display generosity, selflessness, hospitality and a willingness to support other family members, and to assume responsibility for their errors as well (Dhami and Sheikh, 2000).

The outcome of economic prosperity is clearly visible in Saudi families. The majority of them have house helpers such as housemaids, drivers, and other servants who do the basic house work. These people compete to serve all family members and are much relied on for their help and support (Jones,

2010). However, because of the prosperity in the Kingdom, many people in Saudi Arabia do not need to work and thus live a rather sedentary life, for example by eating rich food, remaining inactive most of the time and driving everywhere. These behaviours and attitudes contribute to adopting new but less healthy lifestyles mainly among the children and young adults (Al-Hazzaa Hazzaa *et al.*, 2012).

2.3.2.3 Gender roles

Generally, social and traditional norms determine gender roles, but in Saudi Arabia gender roles are governed predominantly by Islamic interpretation and government laws. The social structure in Saudi Arabia remains largely conservative, male-dominated, collectivistic, and patriarchal, with great emphasis on family values and group cohesiveness (Long 2005). In Saudi society, men take key decisions in the family including the decisions about occupation, education and marriage. Control of women, by their fathers and/or husbands, ensure female chastity and thus family honour as well as the patrilineal character of the family (Moghadam, 2004). In Saudi society in general, the role of women is primarily to maintain the structure and cohesiveness of the family and therefore the society (Al-Rasheed, 2013). Mores such as the veiling and separation of women are not only tied to family honour but are held to be a religious obligation as well. Yet, some families adopt more liberal standards than others in defining the extent of veiling and separation, although the underlying value of sexual modesty is almost universal (Al-Rasheed, 2013). Because the separation of women from unrelated men is accepted as a moral imperative, most activities of women outside their household are mediated by men, their legal guardians. Consequently, there are many cultural limitations on behaviour that are strictly enforced both legally and socially in the Saudi community, particularly for women (Al-Rasheed, 2013). For instance, women have to wear proper Islamic attire that covers all but the hands and face in public (Abaya), and there are

restrictions for them while going outside or mixing with people. They are also traditionally not encouraged to pursue higher education or gain formal employment and they need to obtain guardian permission to travel or study abroad (Choudhury and Al-Sakran, 2001). These social and religious obligations restrict their abilities to live freely and limit the policies designed for them (Aldosari, 2017). However, these traditional practices have been fading gradually and more women are now receiving higher education and joining the workforce. This development is the result of Saudi Arabia undergoing a major modernisation process in health, education and other services resulting from urbanisation. This significant shift was accompanied by the announcement of the National Transformation Programme 2020 and the Saudi Vision 2030 in favour of women and gender equity (Vision 2030, 2017).

2.3.2.4 Economy

Saudi Arabia is one of the wealthiest and fastest growing nations in the Middle East due to its vast oil resources, and ranked as the world‘s largest producer and exporter of oil, playing a leading role in the Organisation of Petroleum Exporting Countries (OPEC), as well as being one of the Group of Twenty (G20) of countries with major economies (The World Bank Group, 2018). The economy is dominated by oil activities, which account for roughly 75% of budget revenues, 45% of gross domestic product (GDP), and 90% of export earnings (Ministry of Economy and Planning, 2017). The per capita income of the country during the past decade has increased significantly and exceeded 120,000 Saudi Arabian riyals (SAR) per year in 2017 (Ministry of Economy and Planning, 2017).

The economy of the country had been historically dependent on oil revenues, making it vulnerable to fluctuations in the global oil market. However, over the

past decade, the government has embarked on a plan to diversify from almost exclusive oil based output to other economic sectors and products including power generation, natural gas exploration, petrochemicals and investment in the healthcare sector (Ministry of Economy and Planning, 2017). The currency of Saudi Arabia is the Saudi riyal with a fixed exchange rate of 3.75 Saudi Riyals per one United States Dollar (USD). Due to petroleum industries, most Saudis are economically well off and live a luxurious life.

2.3.2.5 Education

The history of formal education in Saudi Arabia is a relatively new one. Before becoming a nation in 1932, the formal education system of the country was limited to a few religious schools (Vassiliev, 2013b). Soon after, the education sector established Religious Sciences Schools, secondary and private schools for men only and girls' education began a decade later (Elyas and Picard, 2010). Presently, education is free at all levels in Saudi Arabia and the government is keen on ensuring the basic education for all, which can be seen in the significant jump in literacy level, which reached 94.84% in 2015, compared to 70.82% in 1992 (World Data Atlas, 2015).

The official language of Saudi Arabia is Arabic, which is the language of Holy Quran. Classical Arabic, highly literacy and formal, is used for prayers and religious rituals, poetry, lectures, and written communications. However, people use colloquial Arabic in their everyday communication, it has many accents and dialects and it varies slightly depending on origins. The Saudis' utilisation of their language reflects the values of their culture. However, the message people are trying to convey often relies heavily on other communicative cues, such as body language and eye-contact, rather than direct words (Long, 2005). In this respect, people make assumptions about what is not said. A particular emphasis is also placed on the tone of voice, the use of silence, and facial cues (Al-Rasheed, 2010). These non-verbal aspects

of communication are vital to be aware of during interviews in order to avoid misunderstandings. In fact, addressing elders and women in a culturally acceptable way is displayed through the language (Long, 2005).

2.3.2.6 Rapid changes

In recent times, the Kingdom of Saudi Arabia had undergone a dynamic and swift development among countries in the world. This rapid urbanisation has provided positive effects such as wider educational facilities, easier transport and communication options and higher incomes for Saudi Arabians. Furthermore, Saudi Arabia has been constantly exposing itself to the global context, which has had profound effects on the values of this conservative society (Jones, 2010; Elyas and Picard, 2010). This exposure, which is accompanied by knowledge transfer from other countries, is further enhanced through the use of modern telecommunication approaches and social media (Abokhodair and Vieweg, 2016). As previously mentioned, the Saudi culture has been historically very conservative in nature. For many years the Saudi government and general population were against adopting foreign cultures.

There are several values and norms, which Saudi people consider as the best practice. For example, in the Saudi community religious and tribal leaders play a strong role in decision-making and they are highly respected by younger people. Illegal drugs, alcohol and out of marriage sexual relationships are strictly prohibited and women have to follow specific guidelines, particularly while mixing with other people or moving outside the home (Delong-Bas, 2013). However, with these rapid changes, this conservative culture is beginning to reverse itself with more opportunities open for women and younger members of the population to take part in almost all social, political and economical activities (Vision 2030, 2017). As a Saudi nurse and

university lecturer, I have observed that some Saudis were used to being hesitant to discuss personal well-being and health behaviours, particularly the older generation. However, I have also seen a gradual development of independent thought among many Saudis about personal well-being, education, self-development, society, and culture. Consequently, while in the past, government departments considered people's health and behaviour related information as very sensitive and inappropriate to be within the public domain, nowadays few health behaviour related research projects have been initiated and implemented by educationists and government departments (Al Moraie, Lietz and Seal, 2012; Park, Al Agili and Bartolucci, 2012; Bcheraoui *et al.*, 2015a; Alharbi, 2016).

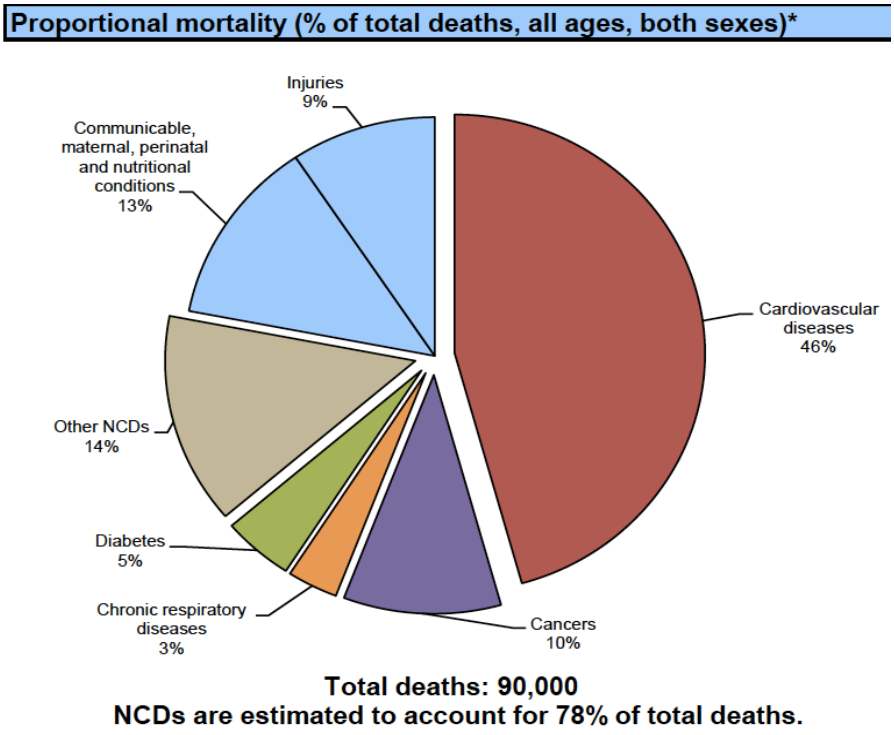
I should acknowledge that this study exploring the lifestyle behaviours among Saudis living with CVD is a very sensitive issue, in contrast to such research in many Western communities. It is quite possible that many Saudis may consider the study's findings as very personal and tarnishing the country's national image and dignity. I have however carefully tried to explore the factors influencing lifestyle habits in a sensitive manner to preserve the dignity and anonymity of the participants. I can also argue that the findings would help plan to mitigate several individual and social barriers currently preventing people from engaging in healthy lifestyles and therefore improving the outcomes of this nation's population. Further reflections on the data collection process and the challenged I faced to recruit participants are discussed in details in Chapter 5 section (5.5.2)

2.3.3 Epidemiological transitions of CVD in Saudi Arabia

Saudi Arabia, as with many other developing countries, has been regarded as a country in transition. It is experiencing a shift in disease type including an increased burden from NCDs that is closely linked to rapid urbanisation,

economic growth and technological advances (WHO, 2017c). This shift in disease burden has been largely attributed to the ongoing lifestyle changes and nutritional transition characterised by changes in food supply and lack of physical activity (Memish *et al.*, 2014b). As a result, chronic diseases, including CVD, are creating a significant toll on the country's individuals, society and healthcare systems (Memish *et al.*, 2014b).

Limited national epidemiological data exist on the prevalence of cardiovascular disease in Saudi Arabia. The only nationally representative study has reported a crude prevalence of CHD of 5.5% among Saudi population and dated back to 2004 (Al-Nozha *et al.*, 2004). Nonetheless, according to the WHO Global Health Observatory data (2014), ischemic heart disease is ranked as the second leading cause of death and estimated to count for 40% of all deaths in Saudi Arabia (Figure 2). In 2012, the number of CVD deaths per 100,000 Saudis was 198.2 for women and 197.1 for men (WHO, 2018a). The prevalence of CVD is promoted in turn by a high prevalence of cardiovascular risk factors in Saudis including diabetes mellitus (DM), hyperlipidemia, hypertension, obesity and smoking (Al-Nozha *et al.*, 2005; Al-Nozha *et al.*, 2007a; Bassiony, 2009; Alavudeen *et al.*, 2013; Basulaiman *et al.*, 2014). Increasing prevalence of these risk factors has had predictable consequences for the people of Saudi Arabia, as manifested today in the growing incidence of CVD (Memish *et al.*, 2014b; Aljefree and Ahmed, 2015).



Source: World Health Organisation - Noncommunicable Diseases (NCDs) Country Profiles, 2018

Figure 2 Proportional mortality rates due to NCD's in Saudi Arabia

2.3.4 Risk factors' burden in Saudi Arabia

Examination of the risk factors to reduce the CVD burden and associated mortality is crucial to prioritise the CVD prevention efforts and strategies in developing countries, such as Saudi Arabia, where the CVD burden is rising. Evidence suggests that diabetes mellitus, hypertension and hyperlipidemia are the core causal health factors, while physical inactivity, smoking, poor diet and obesity are the core health behaviours that contribute to increases in the incidence of CVD (Alhabib *et al.*, 2009; WHO, 2009a; Al-Omran, 2012; Lozano *et al.*, 2013; Mokdad *et al.*, 2014; Ahmed *et al.*, 2017). In Saudi Arabia, the economic growth and rapid urbanisation has led to great changes in lifestyle, including physical inactivity and poor eating habits. Standards of living have increased and ushered in a more sedentary lifestyle than was previously possible (Al-Zalabani, Al-Hamdan and Saeed, 2015). Saudi

Arabians consequently have adopted an energy-dense diet and sedentary lifestyle with a reduction in daily physical activity and energy expenditure relative to earlier times resulting in increased prevalence of NCDs and morbidity and mortality caused by CVD (Al-Hazzaa Hazzaa *et al.*, 2012; Alquaiz *et al.*, 2014; Al-Zalabani, Al-Hamdan and Saeed, 2015; Majeed, 2015; Alkhalaf, 2017; Al-Hazzaa, 2018). This section briefly discusses the burden of the major risk factors for CVD in the Saudi context.

2.3.4.1 High blood pressure

The relationship between elevated blood pressure and CVD has long been established (Franklin and Wong, 2013). Worldwide, around 7.6 million people die prematurely every year, and 13.5% of those deaths are attributable to elevated blood pressure. The largest number of high blood pressure related deaths was caused by ischemic heart disease (47%) (Lawes, Vander and Rodgers, 2008; Forouzanfar *et al.*, 2017). The exact determinants of primary hypertension are not clear, however, high sodium intake, excess body weight and lack of access to treatment are major contributors to high blood pressure (Fuster, 2010a). In Saudi Arabia, the prevalence of hypertension is increasing. The Global Burden of Disease 2010 study estimated that hypertension was the leading risk factor for deaths in the Kingdom accounting for about 24% of total deaths from cardiovascular and circulatory diseases (IHME, 2013). A national survey carried out in 2014 on the prevalence of hypertension among Saudis aged 15 and older (n=10,735) found that 15.2% were hypertensive and 40.6% were borderline hypertensive, with the risk of hypertension increasing among men, relative to age, obesity, diabetes and hypercholesterolemia (El Bcheraoui *et al.*, 2014). The survey findings revealed that 57.8% of hypertensive participants were unaware of their situations. Poor control of hypertension was also apparent in 55% of the participants diagnosed with that condition. The reason for lack of control of blood pressure was limited utilisation of healthcare services, with only 14.8%

reporting having visited a health clinic for a regular check-up within the last year (El Bcheraoui *et al.*, 2014). This finding reflects that Saudis may not engage with preventive health and only seek care for illnesses. This view is further supported by Bcheraoui et al. (2015) who found that few Saudis seek preventive healthcare services and most of their visits were seeking medical attention for injuries or serious sickness. Improved primary care services and developing community based screening programmes for all CVD risk factors at early stages are needed to decrease the burden of hypertensive illnesses in the future (Bcheraoui *et al.*, 2015b).

2.3.4.2 Diabetes and its challenges

Diabetes mellitus is a growing global disease currently affecting around 424.9 million people worldwide. This number is expected to reach 628.9 million by the year 2045, if current trends continue (IDF, 2017). Saudi Arabia is among the countries with the highest age-adjusted diabetes prevalence in the MENA region (17.7%) during the year 2017 (IDF, 2017). According to the Ministry of Health's statistics report, approximately 0.9 million Saudis were diagnosed with diabetes in 1992, yet this number rose to 2.5 million people in 2010 representing an increase in the incidence rates of 2.7 times (Ministry of Health, 2017). Alotaibi et al (2017) conducted a recent systematic review to report on the trends in the incidence and prevalence rates of diabetes in Saudi Arabia over the past 25 years. The findings of the review indicated that the prevalence of diabetes is rising particularly among females, older children and in urban areas. Increased obesity, aging population and the popularity of unhealthy diets, smoking, and sedentary lifestyles may explain the increased burden of diabetes (Al-Daghri NM, 2011).

In order to determine the associated risk factors with the increased trends in diabetes prevalence, Alneami and Coleman (2016) conducted a literature

search on the risk factor for, and barriers to, the control of diabetes among the Saudi population. Misconceptions about the management of diabetes, lack of social support, and lack of healthy environments were the most commonly reported barriers to control diabetes (Alneami and Coleman, 2016). The authors concluded that there is an urgent need for national prevention programmes that target high-risk groups in an attempt to achieve a reduction in risk factor and better diabetes control through the promotion of public awareness, continued screening and early interventions.

2.3.4.3 Hyperlipidemia

Hyperlipidemia is a condition characterised by raised levels of triglycerides, low levels of high-density lipoprotein and high levels of low-density lipoprotein. The condition is a significant predictor of CVD mortality, particularly in diabetic patients (Kopin and Lowenstein, 2017). The 2010 Global Burden of Disease study estimated that hyperlipidemia is a leading risk factor for deaths from CVD in Saudi Arabia. Hyperlipidemia accounted for 5.14% of total deaths, 3.96% of years of life lost and 1.99% of disability adjusted life years (IHME, 2013). Analysis of the Saudi Health Interview Survey (n=10,735) revealed wide prevalence of hyperlipidemia among Saudis with 8.5% suffering hypercholesterolemia and 19% borderline hypercholesterolemia (Basulaiman *et al.*, 2014). Among individuals suffering hypercholesterolemia, 65.1% were undiagnosed and unaware of their condition, 28.3% were ‘treated controlled’, 2.3% were ‘treated uncontrolled’, and 4.3% were diagnosed but ‘untreated’. The risk of developing hypercholesterolemia increased with age, high body mass index (BMI), types of fat consumed, sedentary activities and those diagnosed with diabetes and/or hypertension.

Furthermore, in a cross-sectional epidemiological analysis of the Africa Middle East Cardiovascular Epidemiological (ACE) study, the prevalence of cardiovascular risk factors was evaluated in 505 adults attending primary care clinics in Saudi Arabia. Dyslipidemia and abdominal obesity were the most prevalent risk factors, affecting approximately three-quarters of screened patients (Ahmed *et al.*, 2017). These findings were observed in both genders and across different age groups. High rates of undiagnosed and borderline levels of hyperlipidemia, in a country where chronic diseases are the major health challenge, call for urgent measures to reduce the burden these factors are causing. Understanding the factors that influence Saudis' lifestyle behaviours is a crucial step toward developing targeted interventions to reduce the burden of chronic diseases in the Kingdom.

2.3.4.4 Smoking

Current national data on the prevalence of tobacco consumption in Saudi Arabia are lacking. Some studies have reported an increase in tobacco consumption in the entire Arab world including Saudi Arabia (Mokdad *et al.*, 2014). Other researchers have reported smoking prevalence from a population-based sample of specific regions (Al Turki *et al.*, 2010; Rahim *et al.*, 2014; Al-Khashan *et al.*, 2014). For instance, a cross sectional study investigating the prevalence of smoking in Eastern province of Saudi Arabia (n=196,268, ages 30+) reported a total of 16.9% smokers: 28.7% among men and 4.5% among women (Al Turki *et al.*, 2010). A significantly higher prevalence was found in younger men and older women. Elsewhere, Rahim et al. (2014) reported a 23.5% prevalence of cigarette smoking among attendees of primary healthcare centres (n=4,326) in the Jazan area, located at the Southwest of Saudi Arabia. Another cross sectional study of smoking habits among 10,500 male military personnel in five military regions in Saudi Arabia showed that 35% of the sample were active smokers, with the heaviest smokers being soldiers (Al-Khashan *et al.*, 2014). Regional analysis revealed

the highest rate of smoking (43%) was in the Eastern region and lowest rate (27.5%) was in the Southern region.

In order to assess the status of tobacco consumption in the entire country, and to be able to present nationally representative data, the Saudi Health Interview Survey was conducted with 10,735 individuals aged 15 and older (48.9% males and 51.1% females) between April and June 2013 (Ministry of Health, 2013). The survey included questions on tobacco use, dietary habits, physical activity, healthcare utilisation and self-reported chronic conditions. An overall prevalence of current smoking was 12.2% with males more likely to be current smokers than females. The mean age of starting smoking was 19 years. The findings of this survey indicated an increase in shisha (also called water-pipe or narghile) smoking rates from 3.34% in a STEPwise survey (Ministry of Health, 2005) to 7.35% in men, and from 0.5% to 1.28% in women. Such shisha smoking trends are alarming and of real concern because the habit of shisha consumption is unfortunately socially acceptable compared to other types of smoking; especially for women and younger people in Saudi Arabia and most of the Middle Eastern region (Abu-Hammad Osama and Dar-Odeh Najla, 2011).

These results are compatible with a more recent cross-sectional study of shisha consumption attitudes among Saudi physicians (n= 454) in Riyadh, in which a 45% prevalence of shisha smoking was reported among physicians (Al Ghobain *et al.*, 2018). It is believed that the increased trends in shisha smoking are attributed to a common misconception about the fewer harmful effects of shisha compared to cigarette smoking; many individuals believe that the water used reduces the harmful effect of the tobacco smoke taken via the water-pipe apparatus (Abu-Hammad Osama and Dar-Odeh Najla, 2011; Maziak *et al.*, 2015). The authors further suggested that this lack of awareness about the dangers of different forms of tobacco other than

cigarettes needs to be addressed. This goal can be achieved by educating the population, especially its younger members, about the ill effects of this practice, with reinforcing non-smoking attitudes being a top priority (Abu-Hammad Osama and Dar-Odeh Najla, 2011; Maziak *et al.*, 2015).

Emerging strategies within the arena of healthy lifestyle behaviours, designed to tackle the growing trends in smoking among Saudis, include the implementation of a non-smoking policy in public buildings and workplaces as well as restricted roles of manufacturers of tobacco-based products (National Committee for Tobacco Control, 2015). Owners and managers of cafes and restaurants are increasingly requested to provide separate smoking and non-smoking sections. Also, a number of social outlets have implemented areas where smoking shisha can only take place within the designated smoking areas. It is a significant move towards reducing smoking in the population of a country where, similarly to the UK and other European countries a number of years ago, smoking was an accepted social behaviour and remains so. The UK has made great strides in reducing the harms caused by smoking since applying the tobacco control plan nationwide; with smoking prevalence reduced from 20.2% of adults to 15.5% (Office for National Statistics, 2016) placing the UK as the global leader in tobacco control currently. This achievement has been reached through a comprehensive tobacco control legislation which curbed advertising and established smoke-free places, a ban on both proxy purchasing and smoking in cars with children, as well as standardised packaging (Sims and Gilmore, 2012; The Lancet, 2017).

Whereas there have been some health promotions and reactive measures going on in Saudi Arabia, they seem to be general and, as far as this study is aware, there are yet to be such initiatives specifically tailored for people living with CVD. For instance, in 2004 Saudi Arabia imposed a law banning smoking in public places following the signing of the ‘Framework Convention on

Tobacco Control' (FCTC) with the aim to reinforce tobacco ban in the country, with special attention given to young people (Almunif, 2009). This was targeted at reducing mortality and morbidity rates related to tobacco consumption. Despite putting this law into practice, Saudi Arabia was ranked fourth in the world for tobacco importation in the year 2010 (Al Moamary, 2010). The above state of affairs reinforces the need for proactive interventions, such as targeted behavioural change initiatives, over and above reactive interventions. Findings from this present study provide an in-depth understanding of the social and environmental influences on the adoption of healthy lifestyles; an understanding which is essential for developing contextual based behavioural change interventions for Saudis which, at least potentially, will be both acknowledged and followed.

2.3.4.5 Saudi dietary patterns and challenges

During the last two decades, a shift has occurred in the food consumption patterns and dietary habits of the people in Saudi Arabia. This shift was mainly due to the rapid socio-economic transition which accompanied an overall increase of per capita income and modernisation of Middle Eastern oil countries (Musaiger, 1993; Musaiger and Hazzaa, 2012). The transition in nutrition was marked by abandonment of traditional "Arabian peninsula" diets that were composed mainly of dates, cereals and dairy products that are low in fat and high in fibre (Musaiger, 2006). In their place came more Westernised diets that are high in sugar, salts and fats, together with an increase in food portion sizes (Al-Nozha *et al.*, 2005; Al-Shwaiyat Naseem, Fahmy Alaa-Eldin and Al-Rethaiaa Abdallah, 2010; Bakhotmah, 2012). These changes have led to an increase in the rates of obesity and other metabolic disorders, consequently leading to an increased risk of developing CVD.

Saudi Arabia is a country where traditional cuisines have been passed on for generations in rural areas. With Saudi Arabians being descendants of tribes that were nomadic sheep and goat herders, meat holds a special place in their meals (Long, 2005). With women still holding the roles of preparing food in this country, they determine the way the food will be cooked and the type of food that will be eaten by the family (Al Alhareth and Al Dighrir, 2015). This is to say, the decision on what could be eaten on a given day and what could not, rested with the women. According to Rawas et al. (2012) many Saudi women prefer preparing meat for their families. Saudi Arabians consume 143.3% of fat daily from meat and dairy products, which far exceeds the daily allowance, making them vulnerable to cardiovascular disease (Musaiger, 2002; Shara, 2010).

Moreover, offering food to visitors is one of the ways that Saudis show hospitality. This means that they have a lot of emphasis on the quality of food that is cooked since they are interested in pleasing the visitors who come to their homes. Traditionally, Saudis cook their foods with fats like ghee, butter and vegetable oil (Shara, 2010). The use of spices is common in almost all regions in order to add taste to their foods and make the people eating it have more appetite for meats and vegetables (El-Sabaawi, 2005). Since Saudi women are typically judged based on the type of food they cook, many try their hardest to produce the best tasting meals that their families would like to eat over and over again. The amount of fat content that is contained in the diet of the Saudi Arabian people is high (Shara, 2010). This is because the women have a habit of adding broiler chicken to their daily food. It is estimated that on average, every Saudi Arabian consumes about 88 pounds of chicken per year (Selvanathan *et al.*, 2015). A traditional dish that is regularly consumed in the country is kabsah (El-Sabaawi, 2005). This dish is eaten on a daily basis and consists of rice, meat (from either cattle, chicken or camels) vegetables such as carrots and tomatoes and oil from vegetables or

animals. Recently, the amount of milk, fish, and eggs found in meals prepared in Saudi Arabia has increased (Selvanathan et al., 2015). All of these food items are large suppliers of fat. According to a survey conducted by Al-Alwan et al. (2013), the amount of vegetable oil used between 1960 and 1970 has increased from 9 grams per capita per day to 43 grams per capita per day in the years between 2001 and 2007; an almost five-fold increase. During the same years, animal fat has also risen from 2.41 grams per capita per day to 4.74 per capita per day (Al Alwan *et al.*, 2013). Thus, the cuisine in Saudi Arabia has experienced an increase in the amount of fat content which in turns predispose them to the increased incidence of CVD seen in the country today (Attia *et al.*, 2017).

Recent studies carried out at multiple regions in Saudi Arabia have investigated Saudis' dietary patterns and indicated that the Westernisation of Saudis' lives is the main cause of diet related diseases, including CVD (Alissa *et al.*, 2006; Al-Hazzaa Hazzaa *et al.*, 2012; Al Moraie, Lietz and Seal, 2012; Khalaf *et al.*, 2015; Majeed, 2015). Majeed (2015) surveyed the diet and exercise habits of 215 female college students in Dammam city. The findings asserted that Saudi women prefer to eat processed and fast food rather than fruits and vegetables. The respondents also preferred sedentary rather than physically active lifestyles. Similarly, a cross sectional survey to assess the unhealthy eating habits of 312 university students (180 females; 132 males; mean age 21) showed a high proportion of total energy derived from fat and carbohydrates in both genders (Abdel-Megeid, Abdelkarem and El-Fetouh, 2011). Some of the commonly reported unhealthy food habits were consuming only two meals a day, skipping breakfast and a heavy reliance on fast food meals. The study also reported a significant association of high intake of fatty foods with BMI and hypertension in both genders. Likewise, Sibai et al. (2010) conducted a systematic review of the evidence relating to the burden of CVD risk factors in the Middle East and North Africa (MENA) countries, and their association with dietary patterns. On the whole, trends in

the dietary pattern showed an increase in the consumption of fats, oils and animal protein and a decrease in the intake of fruits vegetables and whole grain cereals.

While modernisation and adoption of a Western lifestyle are key factors affecting nutritional habits among Saudis, cultural norms and social barriers play an additionally important role. For instance, food customs and norms at ceremonial occasions, together with generosity in the size of food offerings, are highly valued in Saudi culture. This highly valued sociocultural food-centric behaviour is particularly evident among the older generation (El-Sabaawi, 2005). The arrival of a guest at one's home is an event that leads to a special meal in honour of the visitor. Traditional etiquette required that sheep be sacrificially slaughtered, and served to the guests as a sign of welcoming (Long, 2005). Major ritualistic occasions associated with Islamic feasts such as Eid, and other social events are still likely to require the sacrificial slaughter of sheep. Further, insistence to overeat during social occasions is widely known as an acceptable social behaviour which may interfere with adherence to healthy diets (AlQuaiz and Tayel, 2009). Because of these social norms, Saudis are consuming high amounts of fats and proteins, which, in turn, increase their risk of developing CVD (Sibai et al., 2010; Attia et al., 2017).

To identify barriers to adopting healthy eating, AlQuaiz and Tayel (2009) conducted a study among 450 Saudi patients (144 males, 306 females) attending primary healthcare clinics in Riyadh city. The patients' ages ranged from 15 to 80 years and a self-administered questionnaire was the instrument employed to gather data. The main barriers to adherence to a healthy diet were lack of willpower (80.3%), followed by lack of social support, (72.4%) lack of time (67.6%) and lack of resources (60.2%). The lack of willpower was significantly higher among the middle-aged group (30-45 years) (p=.029) and

among those ever married (p=.013). It seemed that it is difficult to give up favourite foods and substitute with healthier foods, particularly if the individual is living with a family. Further, the lack of social support was significantly higher among the middle-aged group (p=.034) and in those with less than a university level of education (p=.010). Large numbers of social gatherings with extended families interfered with adherence to a healthy diet. Although the findings of this research provided sound evidence of the challenges Saudis face when trying to engage in healthy eating patterns, the study was based on a Westernised survey developed in countries outside Saudi Arabia. In contrast, using qualitative methods provides a detailed understanding about why people act in certain ways, and also their feelings about their actions (Sandelowski, 2004; Huberman and Miles, 2002). Therefore, in-depth exploration of the challenges and opportunities to adopting healthy lifestyles that the current study provides is vital to developing strategies aimed at limiting the progression of the disease, as well as facilitating the adoption and maintenance of healthy eating lifestyle.

2.3.4.6 Obesity

Obesity is a major risk factor for illness and morbidity. It is associated with diabetes, hypertension, hyperlipidemia, cardiovascular diseases, osteoporosis and several cancers (Haslam and James, 2005). With increased life expectancy and aging population, obesity is becoming a global problem causing more years of disability and reduced quality of life (Seidell and Halberstadt, 2015). In Saudi Arabia, like many developing societies, the adoption of a Westernised lifestyle, characterised by decreased physical activity and high caloric intake, is contributing to an alarming pandemic of metabolic conditions such as diabetes and metabolic syndrome (Sibai *et al.*, 2010). The recognition of the role of elevated body mass index (BMI) in these

changes has made the control and reduction of obesity a high priority for health authorities around the world (Vasanti, Walter and Frank, 2012).

The Global Burden of Disease 2010 study found that elevated BMI was the leading risk factor for disability-adjusted life years in Saudi Arabia (IHME, 2013). Previous studies in the Kingdom indicated an increasing trend in the prevalence of obesity (Ministry of Health, 2013; Memish *et al.*, 2014a). The last national survey on obesity and its associated risk factors in the Kingdom was conducted in 2005, in collaboration with the World Health Organisation. Since then, the Ministry of Health conducted a large household survey, the Saudi Health Interview Survey in 2013. Of the 10,735 participants evaluated, 28% were obese with a BMI over 30kg/m (Ministry of Health, 2013; Memish *et al.*, 2014a). Prevalence of obesity was higher in women as compared to men (33.5% vs. 24.1%). Among women, associated risk factors were marital status, level of education and history of chronic diseases. Whereas among men, obesity was associated with marital status, diet, level of physical activity, and diagnosis of diabetes, hypercholesterolemia and hypertension. A further study was conducted by Al-Jaaly et al. (2011) aiming at quantifying the problem of overweight and obesity in adolescent 13-18 years old girls in Jeddah city. The research was designed to explore the determinants of obesity, with a view to informing health policy. The findings indicated a strong association between a number of factors and weight status of Jeddah adolescent girls. These factors involved individual factors such as biological factors (e.g., age of menarche), as well as lifestyle and environmental factors such as family influence, access to food and societal influence. The study concluded with the need for developing interventions to ensure compliance by parents, schools, dieticians and other health professionals and policymakers to make healthful food choices available for Saudi adolescent girls (Al-Jaaly, Lawson and Hesketh, 2011).

The increased prevalence of obesity among Saudi women could be interpreted as a consequence of social perceptions coupled with cultural restraints. According to Albassam et al. (2008), Saudi Arabian women of childbearing age frequently become overweight and obese due to pregnancy, their diets and reduced physical activity. Alqout and Reynolds (2014) further discussed how cultural restraints imposed on Saudi women could restrict or even prohibit physical activity routines. These women face many cultural challenges to practice sporting activities freely. Seeking permission from family members, obligatory dress code (Abaya), limited recreational facilities, and conservative norms; all serve to restrict physical activity and contribute to the increased burden of obesity among Saudi women (Alqout and Reynolds, 2014). Thus, in-depth exploration of the cultural limitations imposed on Saudi women that prevent them from adopting healthy lifestyle is crucial. Such an investigation will facilitate the development of culturally sensitive interventions designed to tackle the growing epidemic of obesity among women; thereby reducing their CVD risk, which the present study has unveiled.

2.3.4.7 Physical activity and sedentary lifestyle

Insufficient physical activity, which is defined as less than 150 minutes of moderate physical activity per week, is one of the main contributors to the dramatic rise in NCD prevalence globally (WHO, 2017c). Sedentary behaviour on the other hand, which is defined as any behaviour characterised by less than 1.5 metabolic equivalents (METs) while in seated or reclining posture (Gibbs *et al.*, 2015) has associations with cardiovascular disease mortality, obesity, and diabetes mellitus (Owen *et al.*, 2014). Despite the growing research globally confirming the association between physical activity, sedentary behaviour and health risk, there is only a limited amount of research documenting the prevalence of physical inactivity in Saudi Arabia

and oil producing countries of the Arabic peninsula (Alahmed and Lobelo, 2018a).

In response to this deficit, Mabry et al. (2016) conducted a systematic review of physical activity and sedentary behaviour research in the oil producing countries of the Arabian Peninsula including Bahrain, Kuwait, Saudi Arabia, United Arab Emirates, Oman and Qatar. The review findings demonstrated overall low levels of physical activity especially among younger people (Mabry *et al.*, 2016). For Saudi Arabia in particular, two studies were conducted with large difference in the prevalence of physical activity. For a national survey study (n=17,395) including Saudi males and females aged 30-70 years old, the prevalence was very low reporting 6.1% in men and 1.9% in women (Al-Nozha *et al.*, 2007b). Whereas a telephone based study in Riyadh (n=1,064, 66% males; 34% females; ages 15-78) assessed physical activity using the official Arabic short form of the international physical activity questionnaire (IPAQ) (Craig *et al.*, 2003). This initiative reported that 25.1% of Saudis were physically active, 34.3% were minimally active, and 40.6% were inactive (Al-Hazzaa, 2007). The findings also suggested that females were more engaged in moderate physical activity than males, while males participate in vigorous activity compared to their female counterparts.

Further, a national health survey conducted by the Ministry of Health to assess the prevalence of several chronic conditions, found that 60% of the entire Saudi Arabian population were ‘inactive’, relative to physical exercise of some sort (Ministry of Health, 2013). The findings also revealed that 90% of both genders sit consecutively for more than 2 hours daily. This finding is consistent with another cross-sectional study aimed at assessing the levels of physical inactivity among Saudis (n=4,758) which reported an overall prevalence of 66.6% for males and 72.9% for females (Al-Zalabani, Al-

Hamdan and Saeed, 2015). The study used the Global Physical Activity Questionnaire as an instrument (Armstrong and Bull, 2006), which allows comparison with other local and international studies. Gender, employment status and geographical location also presented statistically significant correlations with levels of physical inactivity.

Beside the prevalence of physical activity, few studies have explored the perceived barriers to physical activity among Saudis (AlQuaiz and Tayel, 2009; Alqout and Reynolds, 2014; Al Haramlah, Al Bakr and Merza, 2015). For instance, Alqout and Reynolds (2014) discussed how cultural restraints imposed on Saudi Arabian women could prohibit or limit physical activity. Examples of the cultural challenges these women face that restrict their physical activity include the need to seek the permission from family members, dress code obligations, restrictions on going outdoors, and conservative societal norms (Alqout and Reynolds, 2014). Likewise, AlQuaiz and Tayel (2009) identified lack of resources as the main barrier to adherence to physical activity among patients attending primary healthcare clinics in Riyadh City. The lack of resources was significantly higher for females than males and in individuals with lower incomes. In addition, lack of willpower and social support were ranked second as barriers to physical activity.
In addition to health-related challenges, physical inactivity creates an economic burden in every country. In Saudi Arabia, Ding et al. (2016) have estimated the direct and indirect healthcare costs attributable to physical inactivity to reach a total of $1,038,461, representing 1.71% of the total healthcare costs. Such high levels of physical inactivity in various regions and different population groups in Saudi Arabia combined with the subsequent healthcare costs reflect a major public health concern that requires further action. Therefore, the sedentary lifestyles evident in Saudi Arabia, coupled with high obesity rates and high prevalence of diabetes mellitus, put this population at great risk of being afflicted with a premature CVD (European Society of Cardiology, 2013).

In summary, the prevalence of the above risk factors is increasing in Saudi Arabia; however, little is known about the factors that influence the adoption of healthy lifestyles among Saudis living with CVD. Thus, these factors need to be determined to assist with mitigating unhealthy lifestyles in this population. Many studies conducted in Saudi Arabia on CVD risk factors have concentrated on the general population and prevalence of cardiovascular diseases. These studies have also sought to establish the causes of CVD among Saudis. Some cardiovascular disease researchers in Saudi Arabia have focused on dietary and physical activity interventions. However, the researchers have not yet explored behavioural change based on self-perception as an integral factor in influencing dietary habits. To eliminate the limitation of prior studies, this present research presents an in-depth understanding of the perceived barriers and facilitators to engage in healthy lifestyles after CVD diagnosis of patients in Saudi Arabia for the first time. Healthy lifestyle continues to be the cornerstone of preventive efforts designed to control and reduce the incidence of cardiovascular disease (Iestra *et al.*, 2005; de Waure *et al.*, 2013; Booth *et al.*, 2014b; Brinks *et al.*, 2017). Thus, the findings of this research provide an essential step in developing and implementing tailored interventions and policies that meet the population's needs and are relevant to the Saudi society.

2.3.5 Health infrastructure and system in Saudi Arabia

The rapid socio-economic transition that Saudi Arabia has witnessed over the past two decades opened up an immense opportunity for the country to expand, thereby causing marked impact on both people's health and the country's healthcare services (Almalki, Fitzgerald and Clark, 2011). Healthcare services are provided free of charge to all Saudi nationals and legal residents according to the country's Basic Law of Governance. The Ministry of Health bears the primary responsibility for the arrangement, implementation and provision of accessible preventive and curative services

(Ministry of Health, 2014a). In 1993, the Saudi Commission for Health Specialties (SCHS) was launched to supervise and regulate licensing procedures of health practitioners and accreditation of medical institutions (Bureau of Experts at the Council of Ministers, 2006). Other governmental agencies, such as the Ministry of Defence and Aviation and the Saudi Arabian National Guard, deliver healthcare directly to their employees and certain segments of the general population (Walston, Al-Harbi and Al-Omar, 2008). In addition, the private health sector contributes to healthcare access by providing quality healthcare services, and operating clinics, dispensaries and hospitals, especially in cities and large towns (Al-Yousuf, 2002; Almalki, Fitzgerald and Clark, 2011). The Ministry of Health provides 60% of health services, together with other governmental agencies, and the private sector offers the remainder (Almalki, Fitzgerald and Clark, 2011). Basic healthcare services are provided through a network of more than 2000 primary healthcare clinics spread around the country. Referrals to secondary care in general hospitals or tertiary care in specialised hospitals can be arranged through primary healthcare clinics (Al-Ahmadi and Roland, 2005). In 2005, health insurance was made compulsory for all non-Saudi nationals working in private sector under the Cooperative Health Insurance Act (Almalki, Fitzgerald and Clark, 2011).

Over the years, healthcare services in the Kingdom have remarkably improved, particularly in terms of access and quality. Between 1970 and 2009, the number of hospitals expanded from 74 to 415, while the number of beds increased from 9,039 to 58,126 (Ministry of Health, 2017). In addition, health indicators revealed an overall better performance in comparison to the health systems of neighbouring countries, but not to countries with similar economies. However, challenges of access, timeliness, and quality of services exist and are well documented (Al-Ahmadi and Roland, 2005; El Bcheraoui *et al.*, 2015). In response to these issues, the 10- year strategy of

the Ministry of Health (2010-2020) acknowledged the existence of several healthcare challenges and developed a plan to address them (Ram, 2014). Weak implementation of operational procedures to monitor and improve performance is a challenge that is currently addressed through accreditation and licensing. The challenge of inefficient utilisation of resources affects the utility and availability of healthcare in different regions of Saudi Arabia. The current Ministry of Health's statistics indicate that there is a misdistribution of healthcare services across geographical areas. As a result, people are experiencing long waiting lists for many healthcare services and facilities (Ministry of Health, 2017). Additionally, there is a lack of services for under-privileged groups such as the elderly, adolescents and people with special needs; an issue particularly evident in rural areas. Limitations in the health information system also affect health research, monitoring, and the planning of services. The Ministry of Health's strategy also recognised the weakness in health infrastructure, emergency and referral services, as well as preventive care (Ram, 2014).

Despite the growth of NCDs and road traffic accidents (RTAs), Saudi Arabia is a unique country where outbreaks of infectious disease are always a threat because of the large number of pilgrims visiting the Kingdom throughout each year and especially during the Hajj season (Memish *et al.*, 2014b). Conditions surrounding the Hajj such as extended stays in a single geographic area, extreme heat, physical exhaustion, and crowded accommodations usually lead to disease transmission, especially of airborne agents. This threat requires significant effort and resources for infectious disease control and prevention (Ahmed, Arabi and Memish, 2006). Consequently, less importance has been attached to CVD prevention and management in Saudi Arabia, and tertiary healthcare services specifically are at a bare minimum (Al-Daghri NM, 2011). For instance, cardiac rehabilitation, an essential part of the contemporary care of patients with heart disease, is considered a priority in

countries with a high prevalence of CVD (Balady *et al.*, 2007; Wenger, 2008). Nonetheless, cardiac rehabilitation programmes are not widely implemented in Saudi Arabia and, if available, they are centred in urban settings and exclusive to private organisations, in which the majority of needful patients do not have access to such services (Mutwalli *et al.*, 2012).

As the prevalence of cardiovascular risk factors continues to grow implying an increasing burden of cardiovascular morbidity and mortality, it is imperative to have adequate healthcare systems in the country that aim to integrate primary and secondary preventive programmes, as well as coordinating public and private healthcare services (Perel *et al.*, 2015; Lawlor *et al.*, 2018). Understanding the social and economical issues, whilst also adapting to the culture, local context, resources, and capacities of specific settings is essential for developing contextual based interventions to achieve CVD risk-factor reduction in Saudi Arabia (Yusuf, 2014).

2.3.6 Current CVD prevention strategies in Saudi Arabia

National and international efforts to prevent and control Non-Communicable Diseases (NCDs) have grown significantly following the World Health Assembly Resolution that considered NCDs as a priority (WHO, 2015). As a result, there has been a commitment in the Kingdom to prevent and control NCDs. There is recognition that it is becoming increasingly important to understand the benefits and the costs of preventive interventions. The Ministry of Health in Saudi Arabia requested the support of the UN system in the implementation of the health sector transformational plan (United Nations, 2017a). Few institutions have developed CVD prevention initiatives in collaboration with international organisations for the Saudi population. For instance, in 2017, the American College of Cardiology (ACC), in collaboration

with the Saudi Heart Association launched an innovative programme that leverages the latest science and technology to provide education, resources and practical tools needed to prevent cardiovascular diseases in individuals at risk throughout the country (American College of Cardiology, 2017).

In addition, a community-based intervention called the Crown Health Project (CHP) - was developed and implemented on a small-scale in Al-Jouf region, to assess the feasibility and effectiveness of the programme, in order to potentially scale it up afterwards. The objectives of the CHP were: i) to determine the prevalence of common NCDs and their risk factors; ii) to raise awareness regarding risk factors for NCDs and preventive measures among the public; iii) to improve the early detection and management of NCDs; iv) to build capacity among healthcare workers on preventive services for NCDs; and v) to improve diagnostic, curative, and rehabilitative services for patients (Memish *et al.*, 2013). The CHP was officially launched in mid-2008 and by the end of 2010, the status of the activities per objective was as follows: the survey was conducted among 1,050 respondents and the prevalence of common NCDs and their risk factors were determined. Raising the awareness was achieved through public health education and prevention programmes provided by health promotion units. Health education materials were developed, as well as public service announcement documents for newspapers, TV and radio. A total of 4 capacity building training sessions were organised to train doctors and health educators. The activities for the remaining objectives were not yet started by the time the article was published due to delays in securing of funding for the project's activities (Memish *et al.*, 2013). The authors have not yet published any follow-up work on the project; however, a formative evaluation of the completed activities was reported. The authors concluded that the implementation of the project in the target region was considered feasible. Perhaps the priority is to maintain financial support for the entire duration of the project in order to ensure timely implementation

of activities and to retain trained staff (Memish *et al.*, 2013). Also highlighted was the need to establish good relationships with the media, community/tribal leaders for the promotion of the project. The authors asserted that in order to expand the programme to the rest of the Kingdom, it would be necessary to first complete and evaluate the CHP in Al-Jouf region. In addition, the following programmes tackling NCDs, including CVD, were already launched in Saudi Arabia:

- Smoking cessation programme: the Ministry of Health has taken multiple initiatives to reduce smoking through national awareness programmes including a national website that offers comprehensive tobacco control services; anti-smoking media campaign and anti-smoking mobile clinic that helped more than 2000 smokers quit smoking (Menezes, Hussain and Madadin, 2015).

- Diet and Physical Activity Programme: The programme was established in the Genetic and Chronic Diseases Control General Department in 2006. Aim and objectives of the programme is the application of the National Diet and Physical Activity Strategy (Alahmed and Lobelo, 2018b).

- CVD prevention programme: “The Heart Protection Campaign” led by the Prince Sultan Cardiac Centre in Al-Qassim city was launched in the beginning of 2012. The general objectives of the campaign were to increase public awareness of cardiovascular diseases and their risk factors among women, and to detect new cases in need of medical attention. The campaign organizers went to the malls, colleges, and governmental offices in three cities (Buraidah, Onaizah, and Medhnab) located in Al-Qassim (n=833). The intervention methods included information booths, posters, pamphlets, and face-to-face interaction with the community members. CVD health education was done with individuals or small groups but did not include any large group lectures (Khalaf *et al.*, 2015).

It is of importance to note that although the Kingdom has more than fifteen cardiac centres in major hospitals, there are only two cardiac rehabilitation programmes or centres (in Riyadh and Dammam) that practice formalised secondary prevention programmes after cardiac events for both genders (Ministry of Health, 2014b). Instead, all patients who experience cardiac events or undergo coronary artery bypass grafting (CABG) surgery are followed-up with a cardiologist in an outpatients' clinic after being discharged from the hospital (Mutwalli *et al.*, 2012; Alasiry, 2018). A cardiologist may give instructions for exercise, nutrition, and medications, but there are very limited community based rehabilitation programmes that are supervised by physicians, nurses, and allied health professionals. In addition, although there are practice guidelines for health conditions, such as hypertension and diabetes in Saudi Arabia (Saudi Hypertension Management Society, 2018), there are no culturally specific guidelines designed for Saudi heart patients or cardiac practice guidelines that address the unique cultural and social needs for Saudis (Saudi Heart Association, 2018). Instead, existing international guidelines from the American Heart Association (AHA) (Smith *et al.*, 2011) and European Society of Cardiology (ESC) (Piepoli *et al.*, 2016) provide a basis for Saudi practice. This situation reflects a significant gap in healthcare programmes targeted at Saudis living with CVD. To achieve a patient's concordance with his/her healthcare programme, it is very important to understand patients' lives, individuality, culture and unique social and cultural circumstances when establishing a model of care for a group of people with special conditions such as CVD (Snowden and Marland, 2013). The present study can help enrich our understanding of the individual and contextual factors that hinder or facilitate lifestyle behaviour changes among CVD patients, thereby informing the development of culturally and gender specific models for cardiac rehabilitation and secondary prevention strategies in Saudi Arabia, so that those strategies and initiatives are tailored to the Saudi culture and each patient's needs.

2.3.7 Health promotion from an Islamic perspective

Today, Islam is one of the fastest-growing religions in the world. Worldwide, there are about 1.7 billion Muslims, making up nearly 25% of the global population (Ruth, 2015). Islam is therefore the world's second largest religion after Christianity. Muslims consider Islam not only as a religion but also a way of living their lives (Rassool, 2000). The Islamic sources of laws or Sharia are the Quran (the Holy Islamic book) and Sunnah: the words and teachings of Prophet Mohammed (PBUH). These sources provide Muslims with almost all life's perspectives, laws and regulations (Assad, Niazi and Assad, 2013). The Holy Quran and Sunnah clearly define and advocate a wholesome lifestyle for Muslims which, if followed, ensure good health, and at the same time define negative and unhealthy lifestyles that if avoided people remain free of sickness and ill health (Assad, Niazi and Assad, 2013).

As Muslims, Saudis believe that health, illness and death all come from Allah (Rassool, 2000). Such belief causes them not to perceive illness as a form of punishment but rather as a way of atonement for one's sins (Al-Shahri, 2002). They also believe that health is a gift from Allah that cannot be wasted and should be cared for and thereby, maintaining one's health is considered a responsibility of each Muslim (Al-Shahri, 2002). Islam, generally, promotes health through encouraging acts such as, moderate eating, regular exercise, abstaining from alcohol or substance misuse, personal hygiene and breastfeeding (Rassool, 2000).

Physical mobility and regular exercise are strongly encouraged in Islam and are modelled by Prophet Mohammed (PBUH). According to the teachings of the Prophet, parents are encouraged to teach their children swimming, archery and horse riding from early life which reinforces the importance of

developing the habits of physical activity (Franceschelli and O'Brien, 2014). In addition, the act of praying five times a day, which involves a series of bodily movements while reciting specific supplications and Qur'anic verses, is considered by the majority of Muslims as a sort of slow moderate exercise (İmamoğlu, 2016). Alongside physical mobility, Islamic teachings promote moderate eating and consumption of good quality food that consists of fruits, vegetables, dairy products and halal meat, which is stated repeatedly in the Holy Quran (Sazelin, 2011). Muslims are ordered by Allah to balance in food and drink; and overeating is believed to be an enemy of moral, healthy and spiritual life (Iftikhar, Albar and Qadi, 2016). Muslims are also instructed to fast during Ramadan, which is an obligatory part of faith for all Muslims who are well and fit enough to abstain from eating and drinking from early dawn to sunset. Fasting has been found to provide protective effects on health (Azizi, 2010; Alkandari *et al.*, 2012).

It therefore can be argued that Islamic perspective on health promotion is a comprehensive approach to healthy lifestyle. Although Islamic faith advocates that Muslims should adopt healthy lifestyles involving regular exercise, moderate eating, and abstinence from alcohol, Muslim countries are plagued by the rise in the prevalence of lifestyle related diseases (Cross-Bardell *et al.*, 2015; Mabry *et al.*, 2016; Alshaikh *et al.*, 2017). It is suggested that these teachings have been eroded by sociocultural factors such as increased economic activities and rapid urbanisation in developing countries (Mabry *et al.*, 2016). Thus, it is imperative to explore the possible influence of Saudis' religious belief system along with other social, cultural and environmental factors to provide a holistic and comprehensive understanding of their impact on healthy lifestyle behaviours.

2.4 Understanding the gap in research and planning for an in-depth investigation

The description of the epidemiological transition highlights the changing trends of disease, from infectious to NCDs, with the huge burden of CVD risk in the MENA region and Saudi Arabia. Reducing these risks is a major challenge for health authorities and affected population. This Chapter has reviewed the global burden of CVD and common risk factors. It then critically analysed the Saudi social, cultural and religious contexts and discussed the major physical and behavioural risk factors directly related to CVD in the context of Saudi society. These include tobacco use; high blood pressure; diabetes; hyperlipidemia; unhealthy diet; lack of physical activity; and obesity. Although the prevalence of the physical risk factors for CVD in the country has been clearly documented, there is less evidence about the prevalence of the behavioural risk factors linked to CVD. Evidence that would help identify the social and cultural contexts that may limit people's ability to adopt healthier lifestyle is sparse. Thus, local evidence to understand the contextual determinants of these behaviours is an important priority to enable the introduction of relevant and country-specific policies to address them. As far as I am aware, no researchers have explored the factors influencing the decisions of Saudis living with CVD to engage in healthy lifestyles. A qualitative study to examine individual and contextual factors influencing lifestyle behaviours among Saudis with established CVD is an essential step to develop contextual interventions and change the CVD risk factors in Saudi Arabia. Further, most cardiovascular disease researchers in Saudi Arabia have focused on lifestyle interventions and very few explored barriers and facilitators of behavioural change based on patients' self perception as an integral factor in influencing lifestyle habits (Saquib *et al.*, 2017). Conducting research into CVD patients' perspectives will enrich the understanding of the pertinent issues influencing behaviour change; issues which will feed into future guidance on designing services according to patients' and families'

needs. This research also generates substantive and context-based data that can be used to guide the development of preventive guidelines for the cardiac rehabilitation centres in the hospitals and community settings of Saudi Arabia. The next chapter reviews and synthesises the empirical literature on the factors that influence the adoption of healthy lifestyles among individuals living with CVD in order to identify gaps in evidence and research needs.

Chapter 3 - Literature Review

3.1 Introduction

This chapter presents a critical review of the existing literature exploring the factors that influence the decisions of patients to adopt and maintain healthy lifestyles after CVD diagnosis. The aim of this review is to identify, evaluate and synthesise the empirical and theoretical literature exploring the multitude of factors, perceptions and attitudes that may influence individuals' reasons to engage in healthy lifestyles after experiencing a cardiac event. Also research needs and evidence gaps will be identified.

3.2 Defining the review agenda

Adopting a healthy lifestyle has been conceptualised in this review as the actions of post CVD diagnosis patients in engaging and maintaining healthy lifestyles, as opposed to continuing with their former unhealthy ones. A healthy lifestyle involves the habits or measures that a person can implement to establish and then maintain good mental and physical health including healthy eating habits, physical activity and smoking cessation (WHO, 1999).

The literature on lifestyle behaviour change is vast and diverse, including qualitative and quantitative empirical work and theory, covering such approaches as interventions, randomised controlled trials, cross-sectional survey studies, in-depth interview studies, ethnographies, observational work and descriptive studies. The literature on the factors that influence the adoption of healthy lifestyles among CVD patients sits within this complex network of empirical and theoretical articles. Encompassed are physical, psychological, social, spiritual, environmental and practical dimensions in

addition to patients' interactions with staff and services in the health and social care system; thus a very broad literature base informed this enquiry.

The aim of this review was not to summarise the public health literature on barriers and facilitators to behaviour change. Rather, the review aimed to identify evidence targeted at, or of particular relevance to, people living with CVD, who are likely to share some of the same issues and challenges when it comes to making and maintaining lifestyle changes. Initially, the review aimed to identify literature exploring the factors specifically relating to Saudis living with CVD. Yet, no coherent body of literature existed to help shed light on the experience of adopting healthy lifestyles for either Saudis or Middle Eastern individuals living with CVD. Due to this paucity of research, the review's focus was broadened to explore literature that included patients with CVD not restricted to Saudi Arabia or the Middle East. The search for literature included both quantitative and qualitative papers, as well as theses and review studies. The review methodology includes an account of the search strategies, screening and selection criteria, relevance and methodological quality. These points are presented below.

3.3 Review methodology

This literature review was not an interpretative review seeking to meta-synthesise findings in order to develop a higher order theory on the topic (Russo, 2007). Instead, the focus was to review the evidence on the facilitating and constraining factors influencing lifestyle changes, of which a descriptive account will be given here. The aim was to identify papers exploring the multitude of factors, perceptions and attitudes that may influence an individual's reasons to engage in a healthy, or healthier, lifestyle after experiencing a cardiac event. Gaps in evidence and research needs were

also identified. A number of key databases were searched along with key authors, reference chaining and grey literature according to a predefined search strategy and a developed list of search terms (Sullivan, Gibson and Riley, 2012).

3.3.1 Search strategy

Nine electronic databases were searched systematically for evidence: i) Applied Social Sciences Index and Abstract (ASSIA), ii) Medline, iii) Embase, iv) Cumulative Index for Nursing and Allied Health Literature (CINAHL), v) PsychINFO, vi) AMED, vii) PubMed, viii) SSCI (Web of Science), and ix) Global Health (O'Brien, 2016). The search was conducted using the search terms listed in Table 1, employing truncation when needed. However, the format of some databases varied and so searches were adapted to suit individual databases (O'Brien, 2016). The search was limited to peer-reviewed publications in the English language from January 2001 through to May 2018. This year limit was applied to help retrieve only the most recent literature. Articles identified in this manner were retrieved and screened for relevance and methodological quality in order to be included or excluded from this review. The reference lists in a selection of key articles were also searched for additional relevant articles (Hart, 2018).

Table 1 Search terms

	OR	OR	OR
AND	Coronary heart disease(s) Coronary artery disease(s) Cardiovascular	Lifestyle change(s) Healthy lifestyle(s) Health behavior(s) Health behaviour(s)	Impact Influence(s) Factor(s) Effect(s)

	disease(s) Cardiac Heart disease(s) Acute coronary syndrome Myocardial infarction Unstable angina CVD MI ACS CABG	Lifestyle choice(s) Lifestyle modification Health behavior change(s) Health behaviour change(s)	Barrier(s) Facilitator(s) Determinant(s) Challenge(s) Opportunities Obstacle(s) Difficulties Issue(s) Enabler(s) Motivator(s)

3.3.2 Eligibility criteria

For a study to be considered for review and evaluation, it had to address the factors that influence lifestyle changes in cardiac patients. Relevant studies were included if they met the following criteria:

- Articles that included patients diagnosed with CVD.
- Full text published journal articles.
- Evidence found relating to uptake and maintenance of physical activity, diet and eating behaviours and/or smoking behaviour.
- Originally in, or translated into, the English language.
- Published between January 2001 and May 2018.
- Participants were adults aged 18 years and above.
- Qualitative, quantitative, mixed-methods, reviews studies, and dissertations.

Articles deemed not relevant and were excluded if they had unclear methodology, inquired into children and youth populations or reported factors

relating to participation or effectiveness of specific interventions were excluded from the review.

3.4 Findings

Using the search terms detailed in Table 1, databases Medline, Embase, AMED, PsychINFO and global health were searched simultaneously. A combined search of the three sets of search terms yielded 674 records including duplicates. Abstracts were screened for relevance and 45 records remained. The articles were screened out and rejected if they did not refer to adult cardiac patients; they were non-English language articles or they were related to medication adherence or effectiveness of specific interventions.

A search of CINAHL produced 8,793 results after duplicates were removed. Results narrowed down to 3,707 after applying age, subject and language limits. There was significant overlap/ duplication with the results from other databases. On the whole, the results from these databases were much more relevant than those from Medline and EMBASE. The articles removed from the set were: a) related to children and youth population, b) related to intervention development or c) tended to refer to lifestyle changes in chronic diseases other than CVD. Of the 454 articles identified, 21 were retained.

A search of ASSIA identified 15 articles in all, 6 of which were relevant to this review. However, all of these articles had also been identified by other databases. Whereas a search of PubMed yielded 846 articles in total, of which 24 were relevant. The vast majority was not relevant, covering mainly clinical aspects, treatment or intervention development.

Reference chaining or ‘snowballing’ was an effective means of finding relevant papers (Hart, 2018). By searching reference sections of key papers, further articles (n=4) related to that topic that may not otherwise have been picked up in the databases searches were identified for inclusion in the review. The remaining 103 full-text articles were next examined in which a total of 30 articles were judged eligible for inclusion in the review as illustrated in Figure 3. Key findings of each study were extracted and summarised in order to organise the evidence. Of the 30 studies, 23 were qualitative, 2 quantitative 1 mixed method and 4 review studies. Summaries and characteristics of the papers selected are presented in Appendix 1. The selected papers were specifically reporting on the experiences and factors influencing individuals’ ability to engage and maintain lifestyle changes after cardiac events. Attempts have been made to theme the main findings of the studies reviewed in order to investigate similar phenomena, as follows: i) living with heart disease; ii) health and quality of life; iii) sociocultural factors; iv) the physical environment; and v) psychological factors.

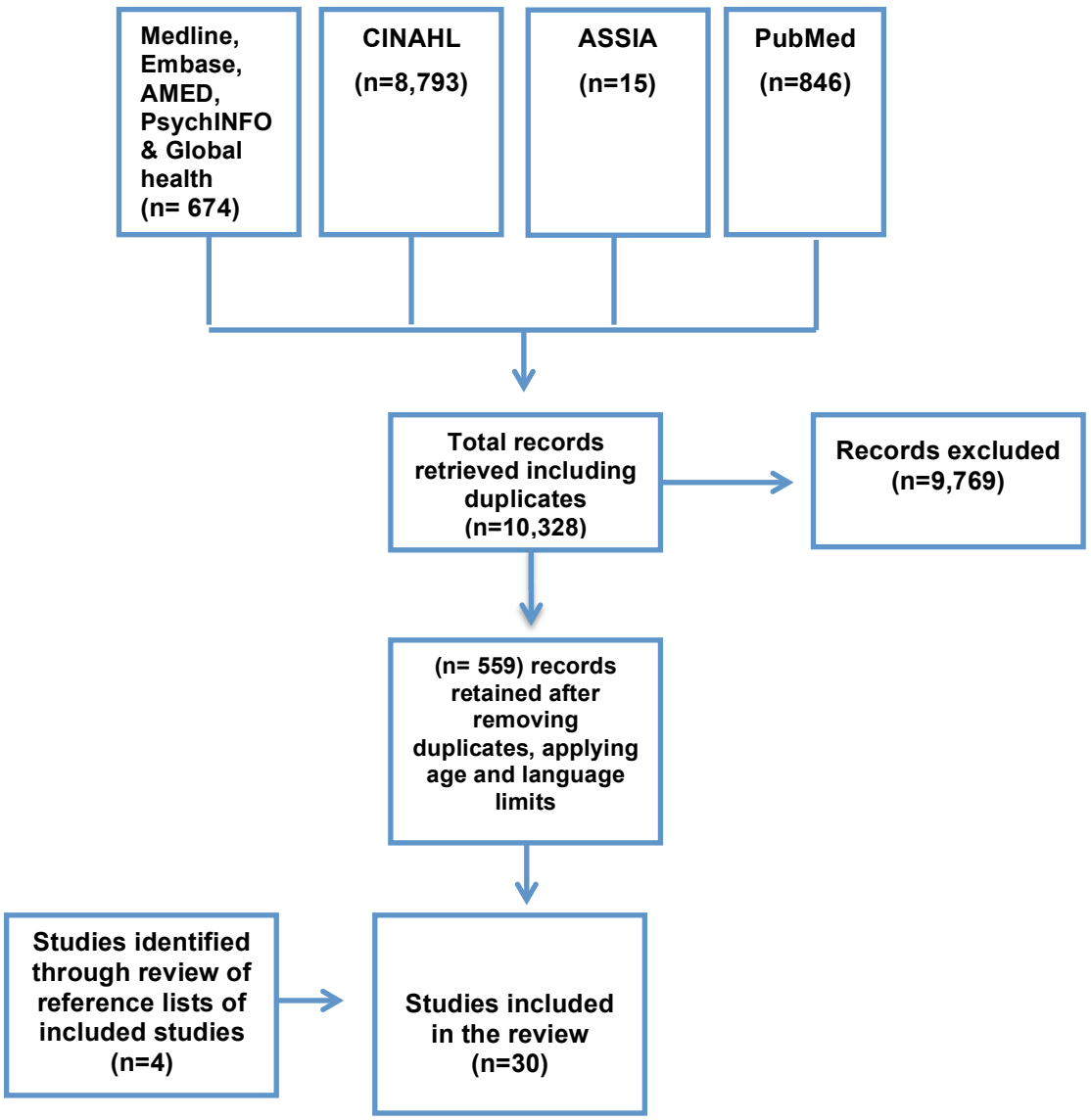


Figure 3 Flow diagram of studies selection criteria

3.4.1 Living with heart disease

Patients' experiences and reactions to heart disease diagnosis have been sign-posted as highly significant in predicting future adaptations of those patients to their illness and the efficacy of their efforts at making lifestyle changes to reduce their cardiovascular risk (Condon and McCarthy, 2006; Peterson *et al.*, 2010). Understanding the meaning of living with heart disease is therefore crucial in developing interventions to meet patients' and caregivers' needs and is therefore an issue that warrants exploration. This section reports on six studies looking at the meaning of living with heart disease from the patients' perspectives, so as to build a picture of the complexity of adjusting to a chronic condition such as CVD.

Peterson et al. (2010) interviewed patients who had undergone percutaneous transluminal coronary angioplasty (PTCA) in the United States (USA) to explore their attitudes, values and beliefs that influence behaviour change (n= 61; mean age of 64 years) as a part of a wider parent-study (Charlson *et al.*, 2008). Participants who completed a 2-year follow-up were invited to participate and contacted by telephone. A key finding was the perception that receiving heart disease diagnosis and undergoing stenting was a life-threatening event that became a turning point in those patients' lives. Participants expressed an overwhelming fear of death and/or disease recurrence, which resulted in a renewed sense of appreciating life and became a prime motivator to make lifestyle changes together with having a new outlook on life. Patients also shared regrets over past behaviours due to fear of death and the sense of their vulnerability to illness. Supporting these findings were studies conducted by King et al. (2007) and Junehag et al. (2014) indicating the positive influence of developing CHD on lifestyle behaviours. Participants in the grounded theory study conducted by King et al. (2007) in Canada (n=22, ages 44-79) reflected on their illness experiences

and expressed a variety of levels of insights into their vulnerability to CHD. They worked to create meaning from their illness experience, which for some was the right time to reconcile the shock of having an unexpected cardiac event and re-evaluate their lives and past behaviours in order to make necessary changes. Participants referred to surviving a cardiac event and living through diagnosis as having a “second chance” which cannot be wasted. As a result they were motivated to tackle and implement lifestyle changes that may increase their life span.

Likewise, Junehag et al. (2014) qualitatively explored individuals perceptions of illness and lifestyle change 1-year after experiencing myocardial infarction (MI) in Sweden (n=20; ages 46-73). The authors explained how participants’ feelings of surviving an MI were associated with profound fear and anxiety, which were translated into a strong desire to adopt new routines in order to start living a healthier life than previously. Their illness experiences made them also appreciate the small joys in life and caused them to start thinking of their lives in a more positive way. Participants were keen to create a new life and adapt to their new habits no matter what they thought about it and how tough were the preventive decisions they needed to make. They were grateful to be alive and regarded the future positively. These statements were in line with those from Cordon and McCarthy (2006) relating to the positive influence of surviving cardiac events on lifestyle behaviours. The authors explored the perceptions of making lifestyle changes through individual interviews with Irish MI survivors 6 weeks after discharge (n=10) and suggested that survival was a major factor in motivating and empowering participants to undertake lifestyle changes following cardiac events (Condon and McCarthy, 2006). Resuming normality and embracing the future with hope was also perceived by many participants as a motivating factor to sustain them in maintaining their lifestyle changes.

Although the reviewed studies gave insights to patients' experiences immediately following diagnosis up to 2-years, none of them have explicitly explored changes in experiences and perception over time. Patients' initial experiences when confronted with a CVD diagnosis are mostly fuelled with anxiety and fear of a possible cardiac event recurrence, which is translated in the adoption of healthy lifestyles (Petriček *et al.*, 2017). However, as patients cope with their illness over time, these feelings begin to subside and may not motivate lifestyle behaviour change. To overcome this limitation, participants with various lengths of time since diagnosis were recruited in the present study to develop a thorough dimension of understanding the influence of CVD diagnosis on lifestyle behaviour over time.

On the contrary, negative perceptions about health and developing heart disease was perceived as a barrier to lifestyle changes in a qualitative study exploring barriers and facilitators of physical activity among patients (n=15; mean age 64) diagnosed with both CHD and depressive symptoms within the past 12 months in Australia (Rogerson *et al.*, 2012). Participants were recruited while taking part in a questionnaire study that confirmed their depression diagnosis, during which they expressed their willingness to participate in a further research. The respondents reported having sense of losing their health and dealing with the shock of developing heart disease was difficult for many of them. For some, having a cardiac event brought unexpected forced or early retirement; a circumstance which exacerbated physical inactivity and made it even harder for them to make or sustain changes. Others expressed their thoughts as being on the 'downward slide' after having the heart illness. They perceived themselves as unable to influence their disease and its progression, which led to feelings of helplessness and hopelessness; in turn, reducing their motivation to change their lifestyles. However, the latter results should be interpreted with caution, as only depressed cardiac patients were included in this sample. The finding could indicate that such a barrier may be more salient to people with

depression, rather than all CHD patients. Nevertheless, the negative influence of a CHD diagnosis on lifestyle behaviour was echoed in another qualitative study conducted by Bergman and Berterö (2001) in Sweden. Participants in this study (n=8, ages 39-68) received their diagnosis 5-8 months before the interviews. Feelings of confusion, fear that life will never be the same again after the cardiac event and grief over their lost health were reported by participants as factors that impeded lifestyle changes attempts. Many also experienced fear of relapse and death, as well as developing depressive symptoms which adversely affected their illness behaviour (Bergman and Berterö, 2001). Thus, this dimension is further explored in the present study in relation to Saudis to shed a light on the largely unknown influence negative perceptions and fear of illness may have on Saudis decision to change their lifestyle behaviours after experiencing cardiac events.

Overall, this evidence suggests that CVD patients' perceptions about their diagnosis and survival of a cardiac event can dictate their degrees of adaption to their illness and positively or negatively influence their ability to acquire knowledge and sustain changes to their lifestyles. The sudden health threat and changes in life situations stimulated changes in both emotions and thought processes. Making lifestyle changes to improve and maintain their heart health was a common response by patients to their unexpected change in health status and the complex emotions that the diagnosis evoked, particularly at the early recovery stage. Based on this evidence, the present study aims to explore the experiences of patients at early recovery time as well as over time and their perceptions toward receiving a CHD diagnosis. This focus is designed to provide insight into this critically valuable time period, together with the influence it may have on their lifestyle choices. Moreover, all of the studies cited above were conducted in Western countries in which patients' perception of chronic illness generally differs from those of Saudi patients due to the latter's religious and cultural beliefs attached to their illness experience. Understanding Saudis' perceptions of the meaning of living

with heart disease and the influence it may have on promoting their health in the present study, provided a useful insight into how religious and cultural beliefs can be best utilised to facilitate lifestyle changes, thereby reducing their cardiovascular risk profile.

3.4.2 Health status and wellbeing

A selection of six key papers looking at the influence of health status and improved sense of wellbeing on patients' decision to adopt and maintain lifestyle changes was included in this section to better understand the complexity of making lifestyle changes. It includes the influence of physical limitations or chronic conditions, together with the health benefits of engaging in healthy lifestyle on patients' decision to sustain behavioural changes.

3.4.2.1 Physical ailments or chronic conditions

Physical restrictions and bodily limitations resulting from CVD or other physical conditions had been increasingly reported as barriers to making changes to lifestyle; specifically the adoption of, or participating in, physical activity. Rogerson et al. (2012) reported physical restrictions, particularly in terms of decreased energy levels, as a major barrier preventing patients (n=15; mean age 64) from being physically active post cardiac events in a qualitative study conducted in Australia. Participants voiced their fear of overdoing things and were too scared to exercise in case they caused more damage to the heart or to other body parts. In addition, some participants have developed other physical problems such as knee or back complaints since their cardiac event, which further restricted their ability to exercise and/or to sustain changes to their physical routines. This finding was

complemented by Peterson et al. (2010) emphasising how patients (n= 61; mean age of 64 years) struggled with lifestyle changes due to their physical disabilities in the USA. Physical limitations were either related to coronary heart disease or other comorbid conditions. Sexual difficulties were also revealed by some participants. As a result of these issues, several participants offered fatalistic views about their health and future and perceived lifestyle change as “futile” and pointless (Peterson et al., 2010).

These findings were confirmed by Huffman et al (2015) who conducted a mixed methods study in Boston, USA with 22 patients (mean age 64 years; 59% male) who were admitted for acute coronary syndrome (ACS) and had suboptimal pre-ACS adherence to physical activity, heart-healthy diet, and/or medications while hospitalised and 3-months after discharge. The authors found that participants who remained ‘non-adherers’ to cardiac health behaviours after discharge focused on restriction and sacrifice and identified static factors over which they have little control to justify their non-adherence. More specifically, participants with chronic and pre-existing medical conditions cited their physical disabilities as a major barrier to adopting or sustaining healthy behaviours; thus they remained ‘non-adherers’ after discharge (Huffman *et al.*, 2015).

Thus, it appears that the presence of comorbidities and subsequent bodily limitations imposed a restraining influence on patients’ abilities to engage in healthy lifestyles; in particular physical activity. Although these studies produced sound evidence and well-designed methodology, they lacked the use of theoretical frameworks underpinning their understanding. Exploring this issue in the present study through the lens of the social ecological model and within the context of Saudis with CVDs, shed a light on the effect physical symptoms and comorbid conditions have on limitations in activity; and hence on a person's ability to engage in healthy lifestyles among this population.

3.4.2.2 Acknowledging health benefits of lifestyle changes

The fact that adopting a healthy lifestyle brings numerous physical and psychological benefits and therefore facilitate adherence to lifestyle changes is well supported in the literature. Dunn et al. (2014) and Rogerson et al. (2012) suggested that experiencing psychological benefits of regular exercise such as relaxation, enjoyment, taking minds off problems, and enhancing sense of achievement were perceived by CHD patients in the UK, New Zealand and (n=43) the USA (n=15), as facilitating factors in behaviour maintenance amongst. Participants in Dunn et al (2014) retrospective focus group study had been discharged from early phase CR programme at least 6 months before data were collected over 3-months period. Such sentiments were echoed in another qualitative study of lifestyle changes among patients who have recently experienced MI in Germany (n=21). The study concluded that positive physical feedback and increased wellbeing that accompanied regular exercise led to patients' increased self-confidence and motivation to sustain changes (Nicolai *et al.*, 2017).

Elsewhere, Donnelly et al. (2012) conducted an exploratory qualitative study to investigate the challenges and opportunities to engage in healthy lifestyle among women living with CHD in Qatar (n=50; 30 years old and above). The study combined an ecological conceptual framework (Glanz, Lewis and Rimer, 1990) with Kleinman's Explanatory Model of Health and Illness (Kleinman, 1980) to understand how environmental factors and other social determinants of health influence Arabic women's lifestyle choices after CVD diagnosis (Donnelly *et al.*, 2012). Participants were recruited from an outpatient cardiac centre in Doha and interviews were conducted by cardiac nurses in Arabic. The findings revealed, among other more significant themes,

that parallel to the psychological benefits of adopting healthy lifestyles were valuing ‘looking good’ and ‘feeling healthy’, as both were associated with increased motivation to engage in exercising routines and eating healthy food. Participants also explained how losing weight and staying fit were motives to maintain healthy lifestyles. However, the authors did not specify participants’ length of time since diagnosis, which may contribute to different views on the adoption of healthy lifestyle. A limitation that was addressed in the present study in relation to Saudis.

3.4.3 Sociocultural factors

The influences of sociocultural factors on individuals’ decisions to engage in, and then maintain, healthy lifestyles have been extensively explored in the literature. Such factors include social and professional support, role responsibilities, and cultural norms and expectations. This section reports on 22 studies that further explore this dimension of influence.

3.4.3.1 Social support

A number of studies have examined the influence of social support on the engagement and maintenance of lifestyle changes among cardiac patients. Since the emotional impact of CHD diagnosis is significant, patients always demand reassurance and support from family members, friends, support groups and health professionals both in the immediate phase and long term (Angelo *et al.*, 2013; Astin, Horrocks and Closs, 2014).

To explore patients' views and experiences regarding the barriers and facilitators to following advice about lifestyle change after cardiac events in Scotland, Gregory et al. (2006) conducted interviews and focus groups with participants who had been discharged from hospitals two/three years previously (n=53; 35 men; 18 women) and recruited via a coronary care unit and patients' General practitioners (GPs). The authors reported participants' demands for ongoing support to help with adhering to lifestyle advice as a major finding (Gregory, Bostock and Backett-Milburn, 2006). The type of support desired fell into three categories. Firstly, there were participants who commented on how essential was the help given by family members, particularly spouses, to change and maintain healthy lifestyles. Secondly, there were participants who expressed a need to join support groups and talk to people with similar experiences to themselves. And lastly, there were participants who wanted an informal contact with medical professionals who could provide support that goes beyond what participants expect from family and friends.

In line with this perspective, a qualitative synthesis of 22 studies reported in 23 papers, that explored the factors influencing maintenance of lifestyle behaviour change in individuals with high cardiovascular risk conducted by Murray et al. (2013) revealed social support as the most commonly reported factor influencing maintenance of changes in lifestyle behaviour (Murray *et al.*, 2013). The support provided was either informally from friends and family, or from peers within a group. The influence was primarily facilitative and relating to physical activity and healthy diet behaviour. Based on this finding, the authors suggested a number of areas for health services improvement including: developing more of a focus on social support, education, knowledge and beliefs in lifestyle support services for cardiac patients. Also pointed out was that delivering this type of support should involve better integration between health services and social care services in order to more effectively tackle the consequences of unhealthy behaviours. However, the majority of

studies were conducted in the UK (n=10; 45%), with 41% in the USA, two in Taiwan and one in Australia, constituting a significant gap in evidence relating to studies conducted in Saudi Arabia and the Middle East, which the present study attempted to provide.

The positive roles of family, friends and significant others in the maintenance of physical activity routines was also acknowledged by Rogerson et al. (2012). Participants (n=15; mean age 64) who had been hospitalised for a cardiac event within the past 12 months triggering referral to CR programme were recruited through a medical institution in Australia. They reported being highly motivated by the support offered by significant others, either by having an exercise companion or through encouragement to be active. Dunn et al. (2014) in a retrospective focus group also reported a clear association between social support and increased motivation to maintain long term healthy behaviour among participants (n=43) who had had been discharged from early phase CR programme at least 6 months before data were collected over 3-months period. Social support was defined by participants as “family and friends supporting and encouraging lifestyle maintenance, practicing same lifestyle and providing healthy food and company for exercise”.

To investigate the role of social support in lifestyle behaviour change from healthcare providers’ perspectives, Speechly et al. (2010) conducted in person interviews with GPs and telephone interviews with their CHD patients’ (n=8), who had consulted them in the past year in Australia (Speechly *et al.*, 2010). Patients highly valued the support provided from peers and family members, which was perceived as an important source of motivation, prompting and confidence building. Based on this finding, the authors suggested that adherence to healthy lifestyles may be improved via GP facilitation of an external source of support for patients with CHD. It was

suggested this source could be a family member, peer or exercise group and therefore called for further exploration through extensive research. The use of telephone interviews with patients in this study was proposed due to cost constraints, however this method of data collection may have impaired the richness of the data, given they were shorter than the GPs interviews. This limitation was considered in the current study in relation to Saudis, which insisted on employing face-to-face interviews with the participants to ensure the depth and richness of the collected data. Elsewhere in the literature, social support from other cardiac patients was found to shape patients' perceptions (n=61) concerning the cause and consequences of their heart disease in the USA, and thus facilitate the ability to stay on track through moments of potential relapse (Peterson *et al.*, 2010).

The significance of emotional support from family and friends on lifestyle change was reported by Nicolai et al. (2017) and Zhang et al. (2016). In Zhang et al. (2016) focus group study of the barriers and facilitators to lifestyle change among CHD residents in rural community of China (n=23; ages 33-70), participants were recruited through community health workers. Analysis revealed that emotional support was perceived as a source of comfort, which ranged from emotional counselling to mutual activities. Participants expressed how such support conveyed feelings of safety and facilitated a return to normalcy. Pets were also included in comments about social support in Nicolai et al. (2017) qualitative study of lifestyle changes among patients who have recently experienced MI in Germany (n=21). Dog ownership in particular was perceived as a strong motivator for maintenance of physically active routines (Nicolai et al., 2017). Consistent findings were reported by Donnelly et al. (2012) who emphasised the active role of grown-up children, particularly daughters, in Arabic women's decisions to engage in healthy lifestyles; input that can go far beyond simple encouragement to the point of controlling the eating habits of the entire family.

In contrast, negative influence from family and friends has also been reported extensively in the literature. While many participants in Nicolai et al. (2017) study (n=21) spoke of family or friends supporting change, many others mentioned that unhealthy behaviours such as smoking and over-eating of unhealthy fatty foods were shared with all family members. The study reported not just a lack of support, but lack of understanding of the relevance of unhealthy eating habits and sedentary lifestyle for health among family members and close friends that negatively influenced patients' attempts to comply with recommended healthy lifestyle strategies (Nicolai *et al.*, 2017). Likewise, King et al. (2007) highlighted the lack of family support as a factor that significantly impeded patients' desire and capacity to make and maintain lifestyle changes in Canada (n=22, ages 44-79). Particular emphasis was placed on healthy diet consumption and cigarette smoking behaviours as the behaviours that are most negatively influenced by family members.

These ideas complement the findings made by Goldsmith et al. (2006) in the USA regarding the dilemmas that might arise when couples talk about lifestyle changes following one's cardiac event. Forty-one participants were interviewed in Illinois; 25 patients who had experienced an MI and/or CABG; and 15 partners of these patients. They were recruited through flyers in cardiologists' offices, cardiac rehabilitation classes, posters at local churches, or referred by other participants. The study placed specific emphasis on meanings of dilemmas of talk derived from Goldsmith's (Goldsmith, 2004) theory of communicating social support to understand how communications between partners can facilitate a desired outcome. Analysis showed that a spouse's good intentions of caring, closeness or sense of responsibility do not always translate into positive interpretation. For some participants, the caring conveyed by talking was viewed as a threat to their autonomy and power. Others viewed it as a potent reminder of their loss of health. The authors suggested that talking with partners about lifestyle change does not always facilitate the process in a positive direction. They highlighted the need for

further research designed to enhance the understanding of patients' perspectives on social support; a focus, which the present study had explored in relation to Saudi Arabian CVD patients.

This statement corresponds with the views of Condon and McCarthy (2006) about the negative influence of families on a member's behaviour change. Respondents, who were Irish patients who had an MI in the past 6 weeks (n=10), reported complaints of families being over protective, especially during early recovery stage. The participants also admitted to feelings of frustration from being overprotected by their partners and children, which reinforced their 'sick role' and thereby prevented lifestyle change (Condon and McCarthy, 2006). Over-protection was also perceived to have a major impact on family relationships, which commonly become tense when participants are not allowed to do what they think they are capable and were used to doing. In response, the authors suggested the need for family-centred care to address the family's needs and concerns. However, this study focused on early recovery phase only by recruiting patients who have had their cardiac events within the last 6 weeks only, which may not reflect the same perceptions of patients who have had longer periods of CHD diagnosis.

On the whole, the role of social and emotional support from friends and family members, and other people with CHD diagnosis, has been shown to play an important role in reducing distress and motivating and helping people to cope with the difficulties of not only living with heart disease but also trying to make lifestyle changes. Nonetheless, the evidence suggests that negative influence of family members' unhealthy habits, combined with over-protective behaviour, can hinder patients' abilities to sustain lifestyle changes. Such complexity in the evidence suggests the need for a deeper understanding and exploration of cardiac patients' needs and perceptions of their social

environments; a challenge which the present study has addressed in relation to Saudi patients.

3.4.3.2 Professional support

Professional support in the form of information, lifestyle advice, level of care and easy and efficient access to the healthcare system is known to improve self-care and facilitate engagement and maintenance of healthy lifestyles. For instance, Won and Son (2017) conducted a cross sectional study to identify the relationship between professional support from healthcare providers and physical activity behaviour among CHD patients (n=237) attending an outpatient clinic in South Korea (Won and Son, 2017). Higher levels of perceived professional support significantly influenced physical activity adherence among participants through enhancing self-efficacy. Elsewhere, Condon and McCarthy (2006) identified the support received from healthcare providers as a source of satisfaction, reassurance and security for Irish MI survivors. Participants (n=10) felt satisfied with the information received and were able to ask a lot of questions and access information via telephone if necessary.

Correspondingly, constraints to lifestyle change were experienced when professional support was lacking or the advice had not been sufficiently tailored to meet the individual's needs. In a qualitative research conducted by Cole et al. (2013) to explore CHD patients' perceptions (n=45) of factors affecting lifestyle change in general practice in the UK, participants reported insufficient support from healthcare professionals as the most commonly expressed barrier to making lifestyle changes. Interviews were conducted in GPs clinics with CHD patients who succeeded to change their lifestyles and those who did not, based on their responses to validated questionnaires at

baseline and 18-months follow-up. Participants thought their health knowledge is too limited to reliably inform any behaviour change. Some denied receiving lifestyle advice at all, while others suggested that their failure to respond to the advice offered led to the healthcare professionals ceasing to provide it. Nicolai et al. (2017) reported consistent findings in Germany, in which physicians and healthcare providers mainly provided feedback on diagnosis and treatment strategies and very little information being focused on lifestyle modification and advice. Patients (n=21) and their families wanted information about what they could do to prevent a recurrence of their condition. Some participants also expressed concerns about their ability to absorb and retain information during hospitalisation due to their emotional reactions to illness. The authors concluded that both the timing and the amount of information provided are critical issues that are essential to take into account in order to meet the patients' information needs.

Gholizadeh et al. (2011) similarly proposed that lack of information was a major barrier to health behaviour change among Middle Eastern women living with CVD in Australia (n=66). Eight focus groups were conducted in the participants' primary languages of Arabic, Farsi, and Turkish in a community setting, in which Participants expressed their dissatisfaction with available health information they obtained predominantly from unreliable sources such as friends or CVD patients. The women further suggested the need for culturally and linguistically appropriate guidelines that include the health benefits for recommended health behaviour (Gholizadeh et al., 2011). Having unrewarding and stigmatising experiences with physicians or other healthcare providers was further identified by King et al. (2007) as a barrier to seeking lifestyle advice. Participants' limited access to health information was also apparent. For some participants, their access to information was particularly enhanced or constrained by their level of education and/or health literacy. Their situation was further influenced by the quality of their relationships with the healthcare providers. However, it should be noted that the majority of the

study participants had received limited formal education (up to junior high school); a variable which contributed to lower literacy levels and difficulty for participants in reading and understanding the many available written resources regarding lifestyle advice. This dimension was considered in the present study by recruiting participants with variant educational levels to reflect the diversity of the study population as fully as possible

On the whole, the role of healthcare professionals in facilitating engagement and maintenance of healthy lifestyles is well established. However, a recurrent barrier cited in the literature is the lack of advice from healthcare professionals or advice which is not sufficiently individualised or appropriate. Such findings highlight the importance of healthcare providers addressing the identified barriers in order to provide the optimal heart health for cardiac patients. Exploration of Saudis' experiences of the role of healthcare providers in promoting their health, as revealed in the present study, has provided a useful insight into how healthcare providers can be best utilised to facilitate lifestyle changes.

3.4.3.3 Role responsibilities

Prioritising familial obligations and considering the influence of the sociocultural environment on behaviour emerged as a major finding in a qualitative synthesis of the influence of social support on health behaviour related to CVD prevention in migrant Pakistani communities, carried out by Kokab et al. (2017). Occupational stress and expectations to provide family necessities were male participants' highest concerns, whereas female participants were expected to prioritise domestic and family chores. As a result, wellbeing resulting from a healthy diet and physical exercise was viewed as non-essential when compared to their familial obligations. Similarly,

family responsibilities were identified as both the principal life priority and the foremost barrier to lifestyle change in a focus group study of 42 women living with CVD in the USA (Eyler et al. (2002). Having multiple roles as a wife, mother and daughter was mentioned as time consuming and difficult, leaving little time or energy for specific exercise programmes. Women placed things like child care, husband care, cooking and their family needs over their personal needs, to the extent of prioritising their family's health over their own. Lack of time due to family responsibilities was echoed in another focus group study conducted by Folta et al. (2008) with 38 women diagnosed with CHD in the USA. Women with children reported busy schedules and little or no time to cook or exercise, whereas retired women reported having the time but not wanting to spend it on either cooking or exercising.

In a different context, Dumit et al. (2016) interviewed fifteen Lebanese patients, diagnosed with CHD for at least a year, and recruited from the cardiology clinics of a medical centre in Beirut, to explore their perspectives on barriers and facilitators to self-care. Family responsibility was also a major concern expressed by participants because strong family bonding is evident in the Lebanese culture. Most women within the sample prioritised their family's needs over their health needs, identifying all aspects of housework as their main role. This dimension is reflected on in the present study in relation to Saudi women, considering the cultural context similarities between Lebanon and Saudi Arabia. Men also identified their roles as breadwinners and expressed their concerns about securing the necessities for their families, due to their country's economic situation, which often took precedence over their own health needs. This sentiment has been echoed by Dunn et al. (2014) who reported patients' perceptions (n=43) of family commitments as a priority that could affect their time available to exercise among New Zealand and UK participants. Work commitment was also perceived to act as a barrier to physical exercise programmes or activities, particularly among people who worked for long hours and were too tired or had no time left to exercise.

Thus, this evidence appears to lend support for challenges encountered by cardiac patients, particularly women and suggests the need for deeper understanding and exploration of their needs as caregivers; it is a priority to find out what their most important concerns are. It also appears that family responsibilities were identified as a barrier to lifestyle changes, regardless of the context where the studies have been conducted. Such a conclusion indicates the necessity for exploring this issue in the Saudi context, as has been attempted in the present study.

3.4.3.4 Cultural norms and expectations

Donnelly et al. (2012) qualitatively explored the cultural and social influences on healthy lifestyle among 50 Arabic women diagnosed with CVD in Qatar through the lens of the ecological conceptual framework (Glanz, Lewis and Rimer, 1990) and Kleinman's Explanatory Model of health and illness (Kleinman, 1980). Employing an ecological perspective to inquiry facilitated exploring the challenges at individual, family and societal levels. Overall, there were a variety of cultural beliefs, values and social practices that had an impact on the participants' diets, levels of physical activity and smoking behaviours. Social courtesy, hospitality and generosity with food offerings were central to women's beliefs and values regarding dietary practices and as such posed a serious challenge to sustaining their healthy diet consumption.

Although it is culturally taboo and unacceptable behaviour for Qatari women to smoke, the cultural acceptance of water-pipe smoking among the younger Qatari generations was highlighted by many participants as an emerging threat to wellness. The authors concluded that sociocultural factors had a great influence on women's decision to engage in healthy lifestyles and argued that any health promotion programmes developed without considering

these factors will likely to be ineffective. They also pointed out the paucity of literature from the Middle East that supports their findings and urged for further research in this area; a plea which the present study has addressed in relation to Saudis. Although the evidence this study provides can be used to inform healthcare policies and interventions tailored for Qatari and possibly other GCC population, the study included a sample of mixed nationals and expatriates women living in Qatar who may have different values and beliefs compared to Qatari nationals. This limitation was addressed in the present study by recruiting only Saudi nationals who share the same cultural values and beliefs, thereby providing more Saudi centric data.

Recognising the influence of sociocultural norms, Iqbal (2014) qualitatively investigated the relationship between cultural values and the promotion of dietary change among poor Pakistanis living with CVD for at least 2 years (n= 24). Eating the same family food appeared to be a cultural norm that was highly valued by most of the participants. The social value of consuming traditional food and its apparent effect on the dietary patterns was also highlighted by the majority of the participants. They believed that obeying their cultural and social norms informing the ritual of eating helped them maintain their social and religious identity among their loved ones, even if doing so meant sacrificing their own health. The author provided recommendations on ways in which interventions for secondary prevention of CVD could be developed to address the social and cultural barriers to healthy eating; two issues which have emerged as significant in the present study.

Consistent with the findings of Iqbal (2014) and Donnelly et al. (2012), Koshoedo et al. (2015) identified cultural and religious norms as deterrents to engaging in physical activities in a qualitative synthesis study exploring the barriers to Black and Minority Ethnic (BME) individuals engaging in physical

activities that was carried in the UK context. Maintenance of South Asian dress codes, females' cultural obligations after marriage, and the threat of the disappearance of traditional values were the three factors that were considered to be more important than the desire to be physically active. The lack of culturally sensitive facilities was another reason BME members were unable or at least chose not to engage in physical activity.

Social pressure, in the form of social norms or peer pressure, can be very powerful in the way it hinders individuals' abilities to engage in healthy behaviours. People may adopt risky behaviours like smoking or excessive consumption of alcoholic drinks, as they want to be recognised and liked by their peers. A study by Cole et al. (2013) revealed that CHD patients (n=45) believed that entertaining peers, friends or even relatives by engaging in mutual risky behaviours was necessary to earn respect of their guests and maintain good relationships with them (Cole *et al.*, 2013). Consistent findings were reported by Nicolai et al. (2017) who found that smokers felt pressured by their social environments to quit smoking. They also had the impression that they must justify their choices to continue smoking (Nicolai *et al.*, 2017).

Hence, this evidence illustrates the complexities of sociocultural factors and the influences of family and community dynamics on an individual's health behaviours. Such complexities suggest the need for deeper understanding of cardiac patients' needs and perceptions of their social environments, which the present study have addressed in relation to Saudi patients. This understanding can contribute to what is known about Saudi patients' views regarding sociocultural influences on behaviour change, so that proactive interventions can be configured accordingly. It should be stressed that the majority of the qualitative work exploring patients' experiences of living with heart disease and making lifestyle changes has been done in Western

countries. Carrying out similar studies in Saudi Arabia will allow for many culturally specific issues to be explored.

3.4.4 The physical environment

The impact of the physical environment on behaviour change has undergone considerable investigation in recent years. Physical environment factors involve neighbourhood safety, climate conditions, and also issues related to access to various health related resources. This section reports on six relevant papers exploring the environmental influence on health behaviour change specific to cardiac patients.

3.4.4.1 Neighbourhood safety

Kärner (2005) proposed that safe and easy access to facilities in the immediate neighbourhood was decisive for the feasibility of engaging and maintaining physical activity routines among CHD patients in Sweden (n=113; 84 men and 29 women). The study interviewed patient who have had experienced a cardiac event within 6 weeks and again after 1 year to explore how patients in the rehabilitation phase of CHD experience facilitating and constraining factors related to lifestyle changes. Likewise, Dunn et al. (2014) found that patients' access to safe and appropriate environments offered immediate incentives for commitment to sustaining lifestyle change. UK and New Zealand participants (n=43) commented on how external factors such as a safe neighbourhood and easy access to walkways can influence the key internal factors of motivation and enjoyment; as a result healthy behaviour maintenance is improved. Similarly Eyler et al. (2002) reported neighbourhood safety concerns as a major barrier to physical activity among women in all

groups (n=42) with slight differences between urban and rural women in the USA (Eyler *et al.*, 2002). Many urban women had to travel outside their neighbourhoods to find places to exercise, which was perceived as an unsafe thing to do. They were mostly concerned about being harassed by strangers or being victim of a drive-by shooting. Rural women were also concerned about harassments but were mostly afraid to walk on roads without sidewalks or poor lighting.

3.4.4.2 Climate conditions

Poor weather conditions, including rain, cold, wind, and reduced daylight hours in winter, were commonly cited as factors that significantly challenged behaviour change and exercise maintenance (Folta *et al.*, 2008; Dunn, Lark and Fallows, 2014; Rogerson *et al.*, 2012; Huffman *et al.*, 2015). In contrast, living in a harsh desert climate, such as exists in Saudi Arabia, prevented individuals from being physically active, particularly during the hot summer months (Donnelly *et al.*, 2012). Therefore, exploring the influences that may poor climate conditions have on sustaining physical activity routines in Saudi Arabia is crucial, which the present study uncovers in relation to Saudis living with CVD.

3.4.4.3 Issues related to access

A qualitative synthesis by Koshoedo et al. (2015) of the factors influencing BME individuals' abilities to maintain healthy lifestyle changes in the UK reported distance to sports facilities, lack of childcare services, and accessing recreational facilities in unfamiliar environments as factors limiting participation in physical activity (Koshoedo *et al.*, 2015). The synthesis suggests that facilities, which are outside familiar environments, or are difficult

to reach, reinforced the barriers that limit access to physical exercise facilities. Elsewhere, in a qualitative literature review carried out by Murray et al. (2012), transport emerged as a key theme constraining patients' abilities to uptake and maintain lifestyle change. Difficulties with access to recreational facilities or specific centres to undertake rehabilitation were perceived as barriers to maintain lifestyle change. Costs associated with transport or gym membership were also reported as obstacles limiting individuals' abilities to adopt healthy lifestyles.

From this evidence the importance of the physical environment, as a structural condition that shapes individuals behaviours, is apparent. Exploring the core set of practical issues relating to access, along with other key areas that Saudis face to initiate or maintain lifestyle change has, through the present study, contributed to what is known about Saudi patients' views on the practical issues and environmental influences informing behaviour change. The findings of the present study can also help healthcare professionals and policy makers to consider more tailored and individualised approaches to lifestyle change that take into account the patients identified barriers, thereby improving the outcomes of the patients.

3.4.5 Psychological factors

A large volume of research illuminates the psychological influence on making lifestyle changes among cardiac patients. Psychological factors include attitude, motivation, self-discipline and determination. This section reports on seven studies highlighting key issues related to psychological factors informing behaviour changes of cardiac patients.

Peterson et al. (2010) represented self-discipline or self-determination as a key component of successful behaviour change among sixty-one CHD patients who managed to change their behaviours after undergoing angioplasty in the USA. Successful patients were able to mobilise internal resources to achieve self-determined change and cope with the challenges of making lifestyle modifications. Likewise, Nicolai et al. (2017) emphasised the importance of personal characteristics, such as self-discipline and willpower, as key factors to maintain lifestyle changes among participants post MI in Germany (n=21). Participants highlighted the importance of using self-monitoring and self-reinforcement to motivate themselves to achieve lifestyle changes. Examples of self-monitoring strategies included goal setting, positive self-talk, using a diary to log dietary intake or using breathing techniques they learned during cardiac rehabilitation. Elsewhere, Dunn et al. (2014) identified mental attitudes and the internal desire to change behaviours as facilitating factors affecting maintenance of healthy behaviour in both New Zealand and UK contexts. Participants (n=43) placed significant weight on having positive mental attitudes to be motivated toward changing to healthier lifestyle, in comparison to the importance of external factors.

The positive influence of the psychological factors on a patient's uptake and maintenance of healthy lifestyles was also highlighted in a qualitative synthesis review from Murray et al. (2013). The authors identified positive attitudes, motivation, level of confidence, self-control and determination as well as coping styles and problem solving skills to be at the core of many factors influential in maintaining changed behaviours among CVD patients (Murray *et al.*, 2013) . The authors also explained how some of the psychological factors reported were personally selected strategies that individuals applied to encourage maintenance of healthy diets and physical activities. Such strategies included practicing positive thinking, establishing routines and self-monitoring; all of which are consistent with the cognitive behavioural strategies commonly used in rehabilitation programmes.

Establishing routines as an incentive for change was also reported by Kärner et al. (2005). Participants (n=113) expressed the importance of structure and regularity in facilitating behaviour change and its resulting maintenance.

A counter perspective was offered by Patel et al. (2014) who interviewed fifty-five Bangladeshi immigrants in the USA to explore their attitudes towards, and difficulties with, modifying CVD related behaviours. Lack of self-motivation was perceived by many participants as a barrier to making dietary modifications. Participants were unwilling to change what they eat or how their food is prepared due to a taste or a particular food being a staple; highlighting the power of habit and culture upon human conduct. Likewise, Iqbal (2014) identified lack of willpower and determination to change as a barrier to the adoption of healthy eating among Pakistanis living with CHD (n=24). Participants spoke about their inability to give up traditional food and change their old habits for the sake of their health. Some asserted that self-control can only be learnt at early developmental age and therefore they would not now, at their age, be able to change their eating habits; a situation very similar to the Bangladesh study cited above and warrants exploration in relation to Saudi context.

Taken together, this evidence suggests that psychological factors have a significant positive or negative influences on patients' abilities to engage in healthy lifestyle or sustain changes. Consideration of the psychological factors in the present study in relation to Saudis, along with other individual, social and environmental influences is imperative to provide a broad holistic understanding of CVD patients' behaviour, so that interventions can be configured accordingly.

3.4.6 Illness beliefs

During early recovery, cardiac patients typically evaluate their past behaviour to make sense of what had happened. An important part of this evaluation process involves both considering what caused their cardiac event and establishing the link between their lifestyle habits and the development of their heart illness. Knowing what caused their illness will influence the way CVD patients manage their condition, as well as helping them make decisions about lifestyle modification. Therefore, this section reports on nine studies that have identified illness beliefs as influential factors informing lifestyle change attempts among cardiac patients.

Savage et al. (2013) conducted interviews with men living with CVD in Canada (n=20). Many participants held a strong belief in the power of heredity and attributed their current illness to their parents or siblings who had suffered from similar conditions. They believed that their genetic readiness to develop heart disease took control over their health. This belief contributed to their feeling of hopelessness and in turn constrained their abilities to change their lifestyles (Savage, Dumas and Stuart, 2013). Similarly, beliefs about the inevitability of disease occurrence and progression, or a belief that CHD is genetic and was inherited were reported by Iqbal (2014) in relation to Pakistani patients. Such beliefs led some patients to feel powerless to influence the progression of their illness leading to fewer or even no attempts to change their lifestyles. Considering the similarities between the Saudi and Pakistani religious contexts informed the exploration of Saudis illness beliefs and their possible impact on lifestyle changes in the present studies. Elsewhere, Stafford et al. (2008) quantitatively investigated the illness beliefs of recently hospitalised patients diagnosed with CHD in Australia (n=193). Heredity was considered as the single most important and most commonly perceived cause of CHD. Such perceptions were found to be consistent with

respondents' actual risk factors. The authors concluded that illness beliefs regarding causes and consequences of CHD do contribute to the adherence behaviour for establishing and maintaining secondary prevention strategies; therefore, modifying these beliefs may improve patients' outcomes (Stafford, 2008).

Similar views were reported by Darr et al. (2008) who conducted semi-structured interviews with individuals living with CVD in the UK (n=65). The study aimed to examine and compare the illness beliefs of European and South Asian patients living with CHD, in order to understand how these beliefs may influence lifestyle modification choices. Positive family history, stress, unhealthy lifestyle habits and fate were mentioned as possible causes of heart disease by participants of all ethnic groups. However, uncertainty existed about the significance of these causes, making it difficult to act on the advice they had been given to make lifestyle changes. For many older participants, a strong belief that they have been fated to have heart disease was evident across ethnic groups. They believed there was nothing that they could do to prevent their illness, which in turn influenced their ability to uptake initiatives to change their lifestyles (Darr, Astin and Atkin, 2008). Also, approximately half of the participants reported stress as a contributing factor to the development of their illness. They described stressful circumstances and events that had caused considerable worry and tension as the reason why they had developed CHD. Despite this perception, many participants made the link between their lifestyle habits and the development of their heart disease. However, the authors argued that it was not clear to what degree these intentions were translated into lifestyle change. Due to this lack of clarity further research was called for to understand patients' cultural and religious beliefs, so facilitating the promotion of culturally sensitive care.

This focus is a critical point, which the present study has addressed in relation to Saudi CVD patients. It appeared that the use of qualitative methods to explore a largely under researched area has facilitated an in depth understanding of the individual experience while giving weight to the social and contextual structures influencing people behaviours, thereby facilitated comprehensive understanding.

These findings concur with other studies that have reported stress as one of the causal attributions to CHD. For example, Patel et al. (2014) conducted a qualitative study to explore the attitudes towards and difficulties with modifying CVD related behaviours among Bangladeshi immigrants in the USA (n=55). Psychological stress was perceived by many participants as the cause behind developing CVD. Women in particular tended to discuss stress more than men and felt that having less stress and psychological tension would prevent CVD in the first place. Nonetheless, in another study, stress caused by socio-economic status, political insecurities and hard living conditions was found to impede Lebanese patients' abilities to change their lifestyle practices (n=15) rather than being a direct cause of their CVD condition (Dumit et al., 2016).

From a quantitative perspective, a cohort study of 716 participants carried out in England investigated the association between stress, low mood and behaviour change, following their experiencing a cardiac event (Dennison *et al.*, 2018). Lower levels of stress were associated with improvements in self-reported physical activity and fruit and vegetables consumption. However, it was also found that higher stress levels and depressive symptoms were associated with lower odds of increasing physical activity and fruits and vegetables consumption. The authors suggested the imperative of considering patient centric psychosocial factors and stress levels, particularly when developing, tailoring and evaluating future interventions.

Apart from stress, other lifestyle factors are frequently perceived as factors contributing to the development of heart disease. For instance, Condon & McCarthy (2006) identified lifestyle factors as contributory causes of heart disease among Irish MI survivors. Smoking in particular was regarded as a major determinant of poor health. Linking lifestyle habits to heart disease seemed an important step in taking responsibility for health and was particularly marked amongst smokers. Although unhealthy lifestyle habits were identified as contributing to the development of CHD, these issues were often seen as secondary to the negative effects of stress. Sources of stress included overwork, poverty, multiple roles, and life situations.

Taken together, this evidence suggests that the identification of causal factors for CHD influences on individual's decision to make lifestyle changes. Specifically, misplaced beliefs about the causes and value of healthy lifestyles predicted non-uptake of lifestyle behaviour change. Such beliefs are fully explored in the present study because for Muslims in general, and Saudis in particular, health beliefs are very complex and interlaced with religious and spiritual beliefs. Full exploration of this dimension of Saudis' experiences in making lifestyle changes underpinned by the social ecological model (McLeroy et al. 1988) can help in better understanding what hinders or facilitates their adoption and maintenance of such lifestyle changes, thereby improving the outcomes of both initiatives and patients.

3.5 Conclusions: Gaps in evidence and research needs

A very broad and complex literature base informed this inquiry and the understanding of factors influencing individuals' decision to engage in healthy behaviours after CVD diagnosis. Interwoven bodies of literature around diagnosis, quality of life, sociocultural factors, physical environment, psychological factors and illness beliefs were reviewed. As far as this study aware, there are currently no studies that have explored, from patients' perspectives, the factors influencing the decisions of Saudis living with CVD to adopt and maintain healthy lifestyles. In depth understanding of the individual and contextual factors influencing lifestyle behaviours the present study provides is an essential step that can inform future guidance for designing and developing contextual based interventions according to patients' and families' needs. With regards to methodology, the predominant use of qualitative studies reflects that method's suitability, as a research design, to provide a detailed understanding about why people act in certain ways, and their feelings about their actions. The current study will complement and add insight into the practical, social, cultural and psychological factors influencing lifestyle behaviours from the perspectives of cardiac patients and their families in Saudi Arabia. In addition, the state of lack or unclear description of the use of appropriate theoretical underpinnings to understanding health behaviours demonstrated by the results of the studies reported in this review reflects a gap in the literature that needs further exploration. Therefore, health behaviour theories and models, with particular focus on how they relate to lifestyle behaviours, will be presented and critiqued in the next chapter with a justification for selecting the social ecological model as the present study's theoretical framework. Further details on the study's purpose, aims and objectives are discussed in section 5.2 of Chapter 5 of this thesis.

Chapter 4 - Theoretical Framework

4.1 Introduction

The factors that could possibly affect individuals' decisions to engage and maintain healthy lifestyle behaviour after cardiac events have been presented and analysed in the literature review above (Chapter 3). It is reasonable to conclude that a gap exists in the current evidence base, with the need for an in-depth investigation into those influencing factors underpinned by appropriate theoretical framework within the context of Saudi Arabia. In order to improve our understanding of these factors, health behaviour theories and models, with particular focus on how they relate to lifestyle behaviours, are presented and critiqued in this section. The use of such health behaviour theories and models aims to a) provide structure for identifying and investigating certain phenomena, b) search for contributing factors and c) help determine what can be changed (Glanz and Bishop, 2010; Linke, Robinson and Pekmezi, 2014). Therefore, the aim of this chapter is to highlight key theories and their relevant concepts, and to describe their application to various health issues pertaining to making lifestyle behavioural changes. This review of existing theories is followed by a critical review of the use of the social ecological model (McLeroy *et al*., 1988) in the area of lifestyle change, along with a justification of the selection of this model as the theoretical basis for the present study.

4.2 Health behaviour theories

The term `health behaviour' is used very broadly to refer to any behaviour that influences, or is believed to influence, physical health outcomes, either by increasing or decreasing their risk or severity (Glanz, Lewis and Rimer, 1990). A number of health behaviour theories or models[1] have been developed over

[1] The terms theories and models are used interchangeably throughout the thesis.

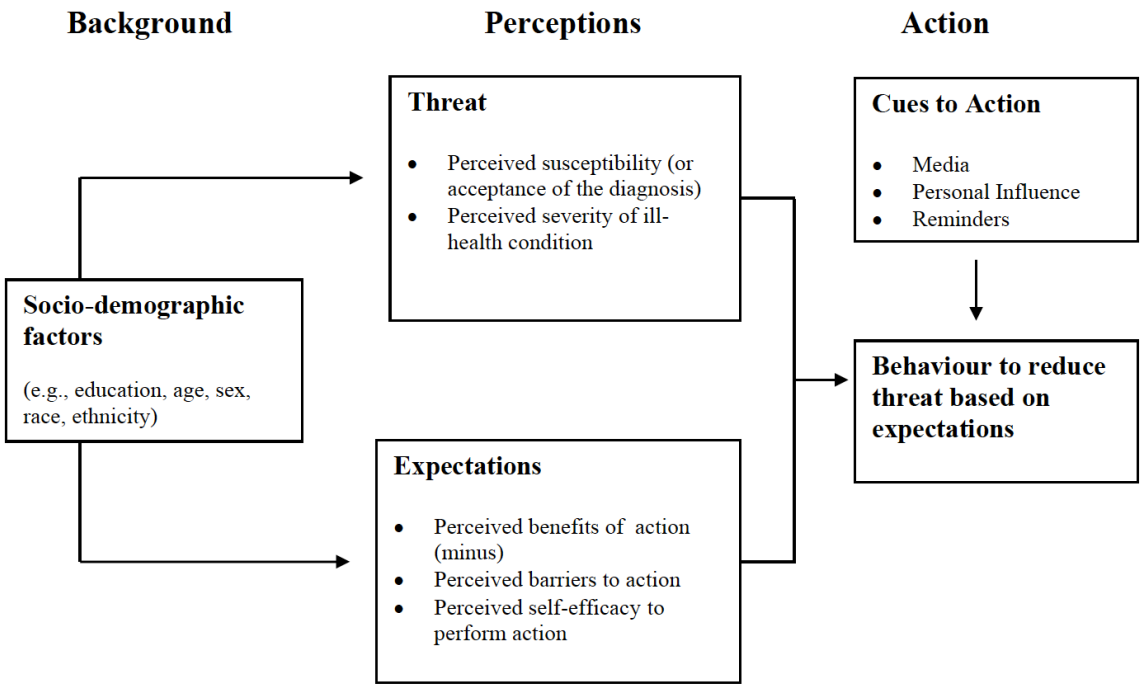
the decades to help explain behaviour, provide solid theoretical foundations for conducting evidence based research as well as provide structure for developing and choosing appropriate interventions to influence or change behaviour. Despite there being numerous models and theories, following extensive reading a pragmatic decision was made to focus on a discrete selection that appeared most relevant to the focus of this study. These theories are: i) the health belief model (HBM), ii) the theory of reasoned action (TRA) and iii) theory of planned behaviour (TPB), iv) the social cognitive theory (SCT), v) the behaviour change wheel, and vi) the social ecological model.

4.2.1 The Health Belief Model (HBM)

The Health belief model (HBM) is a cognitive model which posits that behaviour is determined by a number of beliefs about threats to an individual's well-being and the effectiveness of particular actions and behaviours taken to protect the individual from those perceived threats (Becker, 1974). Developers of the model maintain that HBM consists of six key constructs that influence people's decisions about whether to take action to prevent, screen for or control illness. They argued that people are ready to act if they have belief in: i) *perceived susceptibility*, which is the individual's perception that she or he is at risk of contracting an illness (Rosenstock, 1947; Finfgeld *et al.*, 2003); ii) *perceived severity* of the illness which is the supposed consequences of contracting a health problem or leaving it untreated (Rosenstock, 1947); iii) *perceived benefit*, which refers to the belief that a certain action will yield to a positive or helpful outcome (Rosenstock, 1947); and iv) *perceived barriers* or the negative aspects of particular actions (Rosenstock, 1947). These beliefs are further supplemented by an additional stimuli referred to as: v) *cue of actions,* which involves internal or external stimuli that trigger the decision-making process (Rosenstock, 1947). Cues can include illness in other family

members, information from the media, and concurrent symptoms experienced by the individual (Elder, Ayala and Harris, 1999). Finally comes vi) the belief in *self*-efficacy, a concept derived from Bandura's work dealing with behaviour-specific self-confidence and refers to the perception that one can actively carry out a behaviour or task to produce a desired outcome (Bandura, 1997). Self-efficacy was added later to the HBM in attempt to increase its ability to predict health behaviour accurately (Rosenstock, Strecher and Becker, 1988) The main elements of the HBM are illustrated in Figure 4 below.

According to this model, health behaviour change is initiated by readiness to take action, which is based on balancing beliefs about susceptibility, severity, barriers, benefits and self-efficacy (Becker, 1974; Rosenstock, 1947). Thus, high-perceived threats, low-perceived barriers and high-perceived benefits to action increase the likelihood of engaging in the recommended behaviour. In other words, people will participate in programmes or activities to prevent a disease if they believe themselves susceptible to that disease, if they believe the disease would have harmful consequences, and if the benefits of engaging in the programme or action outweigh the perceived costs of and negative consequences that may result from it (Becker, 1974). It is reasonable to conclude that according to the HBM, people adhere to health behaviour only if they feel threatened by a health problem (Carpenter, 2010).



Source: (Rosenstock, Strecher and Becker, 1994)

Figure 4 The Health Belief Model

The HBM has been extensively used as a theoretical framework for research on numerous health concerns including predictors of breast cancer screening (Yu and Wu, 2005; Parsa *et al.*, 2008; Yilmaz and Sayin, 2014), engaging in health promoting behaviours to reduce the risk of developing osteoporosis (Sedlak, Doheny and Jones, 2000; Nguyen, 2014; Mousaviasl *et al.*, 2016; Ali Khani *et al.*, 2017), and to examine adherence to healthy lifestyles in patients with heart disease utilising both qualitative and quantitative research designs (Macinnes, 2006; Shiplett, 2007; Speechly *et al.*, 2010; Garza, Harris and Bolding, 2013; Reges *et al.*, 2013).

Although the HBM has been used extensively in health behaviour research, concerns about the model applicability to rigorous scientific examination regarding long-term behavioural change outcomes remain (Painter *et al.*, 2008). For example, a meta analysis of studies using HBM constructs to

predict health behaviours longitudinally concluded that the HBM may not be useful when dealing with long-term behaviours because two of its primary constructs, the perceived severity and perceived susceptibility, can only weakly predict long term behaviour change (Carpenter, 2010). Another major weakness of the HBM, is its selective focus solely on individuals' beliefs and perceived risks of developing a health problem; thereby failing to take into account other important determinant of health behaviour such as social and environmental influences (Finfgeld *et al.*, 2003; Munro *et al.*, 2007; Painter *et al.*, 2008). In addition, some behaviours such as smoking and diet are based on habits rather than decisions. Accordingly, applying HBM has not been found adequate to interpret the significance of social, economic and environmental factors in behaviours that are more socially determined (Finfgeld *et al.*, 2003). Such weaknesses are the main reason for rejecting the use of HBM in this study, as the broad goal of this qualitative research was to provide a comprehensive understanding of the influence of social, economic and environmental factors on Saudis' decisions to adopt and maintain healthy lifestyles. There was no particular wish to focusing only on patients' intentions or perceptions of risk, which is the main characteristic of HBM. Thereby, for the purpose of this study, the HBM would not be useful to guide the construction of investigation.

4.2.2 Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB)

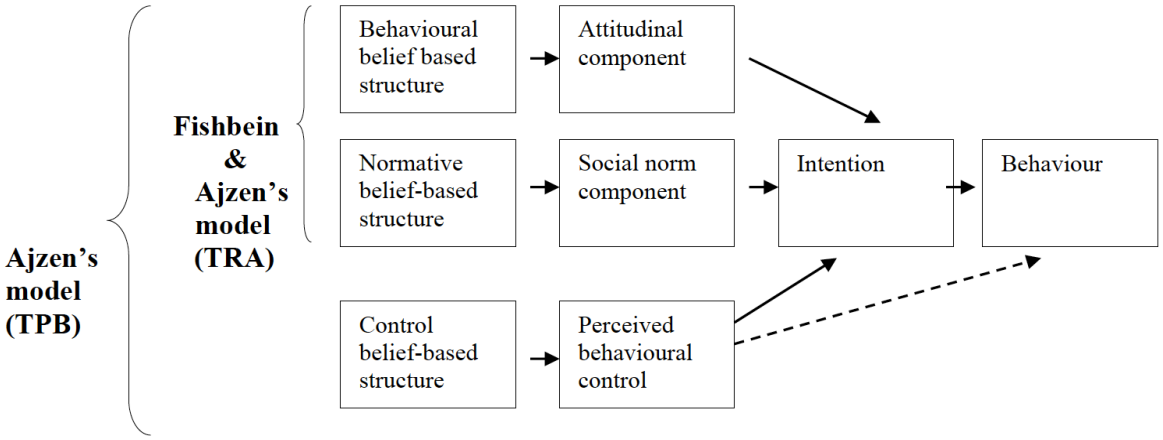
Similar to the Health Belief Model, the Theory of Reasoned Action (TRA) posits that individuals' likelihood to engage in particular health behaviour is predicted by the strength of their intentions to perform that behaviour (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980). These intentions emerge from the combination of two sets of beliefs; individuals' own attitudes toward the behaviour and their subjective norms. Based on the TRA, attitudes

are formed by an individual's beliefs about the consequences of their health behaviour or the expectations regarding the behavioural outcomes. A person's subjective norms are determined by the individual's belief about others' expectations about his or her behaviour, and how those expectations influences their motivation to comply with the expectations of others (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980). The combination of individual attitudes and subjective norms in the TRA is the advantage of this particular model. However, such beliefs are used to predict behaviours under volitional or perceived control and some behaviours may not be entirely under volitional control (Glanz, Lewis and Rimer, 1990).

Therefore, Ajzen (1985) proposed an extension of the TRA, through what is known as the theory of planned behaviour (TPB) and added a third construct called the 'perceived behavioural control', in an attempt to better predict health behaviours (Ajzen, 1991). Such a construct is very similar to the notion of self-efficacy (Bandura, 1997) and may be defined as 'an individual's perceptions of their ability to perform a given behaviour' (Ajzen, 1991). Figure 5 shows the additional dimension of perceived behaviour control.

The TRA and/or TPB have been used in guiding frameworks for assessing, understanding and influencing behaviour change within a variety of health behaviours. With regards to lifestyle behaviour change, the TRA/TPB has been used mainly in quantitative research studies as a theoretical framework (Armitage, 2005; Blanchard *et al.*, 2009; Gu *et al.*, 2009; Hunt and Gross, 2009; Wang, Worsley and Cunningham, 2009; Zamboanga *et al.*, 2009; Zimmermann and Sieverding, 2010; Eto *et al.*, 2011). However, most of them have focused on individuals' intentions towards engaging in healthy lifestyles, rather than what is influencing their lifestyle behaviour. A key concern regarding TRA/TPB is that they do not incorporate any constructs that allow

for emotional or psychosocial variability (Manstead, 2011). In addition, these theories do not take into account the fact that some behaviours are so habitual that they are not vulnerable or amenable to planning and reasoning (Manstead, 2011). A further limitation of the TRA/TPB is that they stipulate that environmental and social processes are relevant only insofar as they influence the beliefs that predict intention (Taylor *et al.*, 2006) Thereby, due to the limited focus of the TPB/TRA, similar to the HBM, it did not offer itself as a possible framework to utilise for the purpose informing this study.



After Godin (1993)

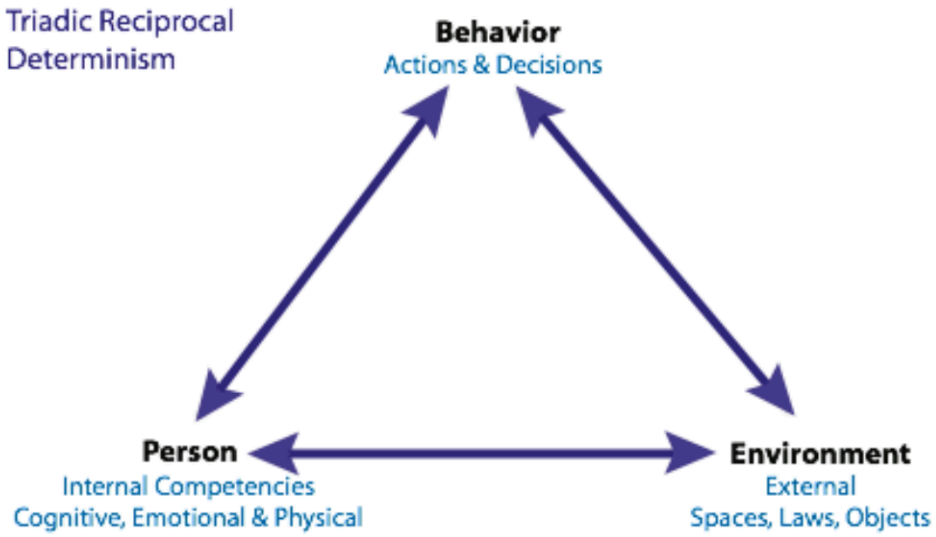
Source: (Godin, 1993)

Figure 5 Theory of Reasoned Action and Theory of Planned Behaviour

4.2.3 Social Cognitive Theory (SCT)

Social cognitive theory (SCT) evolved from social learning theory that was based on the operation of established principles of learning within the human social context, and is argued to be the most comprehensive and robust theory

of behaviour change developed thus far (Glanz and Bishop, 2010; McAlister, Perry and Parcel, 2008). Updated by Bandura, SCT posits that behaviour change is influenced by both internal individual factors as well as the social and environmental factors (Bandura, 1986). The basic organising principle of behaviour change proposed by this theory is *reciprocal determinism* in which each of these factors affects the others in a continuous, dynamic feedback loop (Figure 6) (Bandura, 1986). *Self-efficacy beliefs,* which were defined previously, form the main construct of SCT, and operate together with outcome expectations, goals, and perceived environmental barriers and facilitators in the regulation of human motivation and behaviour change (Bandura, 1997). Self-efficacy can be increased through social modelling mastery experiences, improving physical and mental states and verbal persuasion (McAlister, Perry and Parcel, 2008). According to SCT, health behaviour is also affected by the *expected outcomes*, which may be the positive and negative effects of the behaviour or the material losses and benefits. SCT anticipates that positive outcome expectancies increase the likelihood of health behaviour being performed, whereas negative outcome expectancies reduce the likelihood of the health behaviour (Bandura, 2004). Other important determinants of behavioural change are the *perceived facilitators and barriers*, where changes may be due to the reduction or elimination of these barriers. In summary, this theory proposes that behaviours are enacted if people perceive that they have control over the outcome of their action, there are few external barriers and when individuals have confidence in their ability to execute the behaviour (Bandura, 2004).



Source: Harare (2016)

Figure 6 Bandura's Social Cognitive Theory

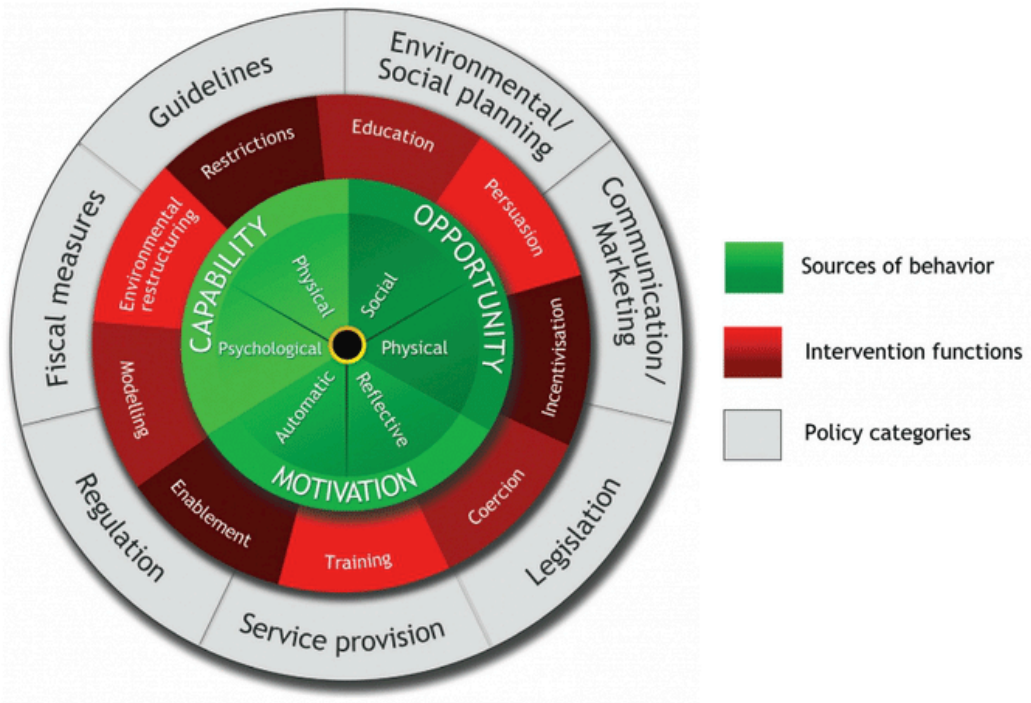
A number of studies have used the self-efficacy model either singly or in combination with other models (Shegog *et al.*, 2005; Elinder *et al.*, 2011; Monteiro *et al.*, 2011; Stafford Randall, Ma and Drieling Rebecca, 2011; Annesi, 2012; Eysenbach *et al.*, 2012; Mason, Gilbert and Sutton, 2012; Carr *et al.*, 2013). The health behaviour being studied was diverse, including alcohol use, food choices and mammography screening. In these studies, self-efficacy referred to the level of perceived ability to perform a particular behaviour and overcome the barriers to achieve that behaviour (Bandura, 1986). In addition, SCT has been used as a theoretical framework to examine factors influencing lifestyle changes in cardiac patients (Krummel, Humphries and Tessaro, 2002; Will *et al.*, 2004; Schwarzer *et al.*, 2008; Bosak, 2008; Alsaleh, Blake and Windle, 2012). Most investigations were quantitative studies, testing and measuring the strength of influencing factors towards the adaptation of a healthy behaviour or the cessation of an unhealthy behaviour. Nevertheless, the disadvantage of the self-efficacy model is its specific focus on the level of perceived ability to adopt a health behaviour (Linke, Robinson and Pekmezi, 2014). Further, it has been argued that SCT is difficult to

employ and is often used only in part due to its wide-ranging focus; such a critical observation serving to raise questions regarding its applicability to intervention development (Munro, 2006). This limitation is the reason the above model has been mainly used to assist the understanding of the research question in quantitative studies. It could therefore be assumed that the self-efficacy model would not be useful in this study, where the aim is to investigate the general factors that influence lifestyle behaviour change and not merely concentrate on Saudis' ability to adopt healthy lifestyles. In addition, the use of the social ecological model offers advantages over the SCT in the present study. This benefit will be discussed in the section 4.2.5 of this chapter.

4.2.4 The Behaviour Change Wheel (BCW)

The most recent addition to health behaviour theories that have received attention is the behaviour change wheel that draws on most of the existing theories and aims to overcome their limitations (Michie, 2014). It was developed from 19 frameworks of behaviour change identified in a systematic literature review (Michie, 2014) and consists of three layers. At the centre of the wheel is a behaviour system, the hub, involving an interaction between three essential and necessary sources of behaviour: capability, opportunity and motivation, called the COM-B system (Michie, van Stralen and West, 2011). Capability is the psychological or physical ability to enact the behaviour; motivation is the reflective and automatic mechanisms that activate or inhibit behaviour; whereas opportunity is the physical and social environment that enables the behaviour (Michie, van Stralen and West, 2011). Interventions need to change one or more of these conditions in such a way as to put the system into a new configuration and minimise the risk of reverting. Surrounding the hub is a layer of nine intervention functions to choose from based on the particular COM-B analysis one has undertaken.

The intervention functions include: restrictions; education; persuasion; incentivisation; coercion; training; enablement; modelling and environmental restructuring. Whereas, the outer layer, the rim of the wheel, identifies seven policy categories that can support the delivery of these intervention functions. These policy categories involve: guidelines; environmental/social planning; communication/marketing; legislation; service provision; regulation and fiscal measures (Michie, van Stralen and West, 2011) as illustrated in Figure 7 below.



Source: Michie et al. (2011)

Figure 7 The behaviour change wheel

These sources of behaviour, intervention functions and policy categories can be mixed and matched in many different ways making it confusing to precisely describe how one intervention differs from another. To categorise different methods of behaviour change techniques and standardise vocabulary with

which researchers and others can define and describe intervention components, Michie and colleagues developed a formal means for characterising behaviour change interventions, the Behaviour Change Technique Taxonomy v1 (BCTTv1) (Michie *et al.*, 2013; Michie *et al.*, 2015). The BCTTv1 is an extensive, integrated, hierarchical classification system of specifying intervention components in terms of 39 behaviour change techniques (BCTs), organised into 16 groups.

BCTTv1 has been used to develop, evaluate and code interventions across a variety of behavioural domains, including physical activity and dietary behaviours (Po *et al.*, 2013; Young *et al.*, 2014), oral hygiene behaviours (Schwarzer, Antoniuk and Gholami, 2015), hazardous and harmful drinking (Newbury-Birch *et al.*, 2014), sexual health behaviours (Booth *et al.*, 2014a; Newby *et al.*, 2013), blood pressure control/management behaviours (Bobrow *et al.*, 2014), antibiotic-prescribing (Prior *et al.*, 2014; Treweek *et al.*, 2014) and diabetes preventative behaviours (Kaholokula *et al.*, 2014). BCTTv1 has also been used by systematic reviewers to identify BCTs within intervention papers, in order to facilitate intervention comparison and evaluate technique efficacy (Arnott *et al.*, 2014; Jones, Smith and Llewellyn, 2014; Morton *et al.*, 2015).

Despite the established evidence on the effectiveness of using the BCW in designing and delivering behaviour change interventions, the scope of the present study is focused on understanding Saudis' lifestyle behaviour after CVD diagnosis rather than designing interventions to change their behaviours. For this reason, the BCW did not offer itself as a possible framework to utilise for the purpose informing this study.

4.2.5 Social Ecological Model

There has been a substantial growth in the application of the psychological models and theories incorporating the broader contexts that affect health behaviour in public health research over the past two decades (Glanz, Rimer and Viswanath, 2008). This growth was accompanied by a shift in emphasis from individual focused to contextual focused determinants of health behaviour (Sallis, Owen and Fisher, 2008). Such a shift in emphasis stems from a growing recognition that most public health challenges are too complex to be fully understood from a single level of influence or point of focus. Instead, understanding these challenges requires a more comprehensive approach that incorporates multiple levels of influence and which also takes into account the larger cultural context in which the behaviour occurs, an attribute offered by the social ecological model (McLeroy *et al.*, 1988; Glanz, Lewis and Rimer, 1990).

Within this model, the explanations of a behaviour is to be found in the two-way interaction of the characteristics of the individual and his/her environment, including the past and the present (Worthman, 2010). According to Stokols (1996), The social ecological perspective is not based on a single theory or discipline, but rather on a broad paradigm that draws from different fields of studies including psychology, medicine, urban planning, environmental design, public policy as well as the behavioural and social sciences (Stokols, 1992; Stokols, 1996). The term ecology is derived from biological science and refers to the interactions between organisms and their immediate environments (Sallis, Owen and Fisher, 2008).

Early ecological models stemmed from Bronfenbrenner's (1979) ecological model of human development, known as developmental psychology or

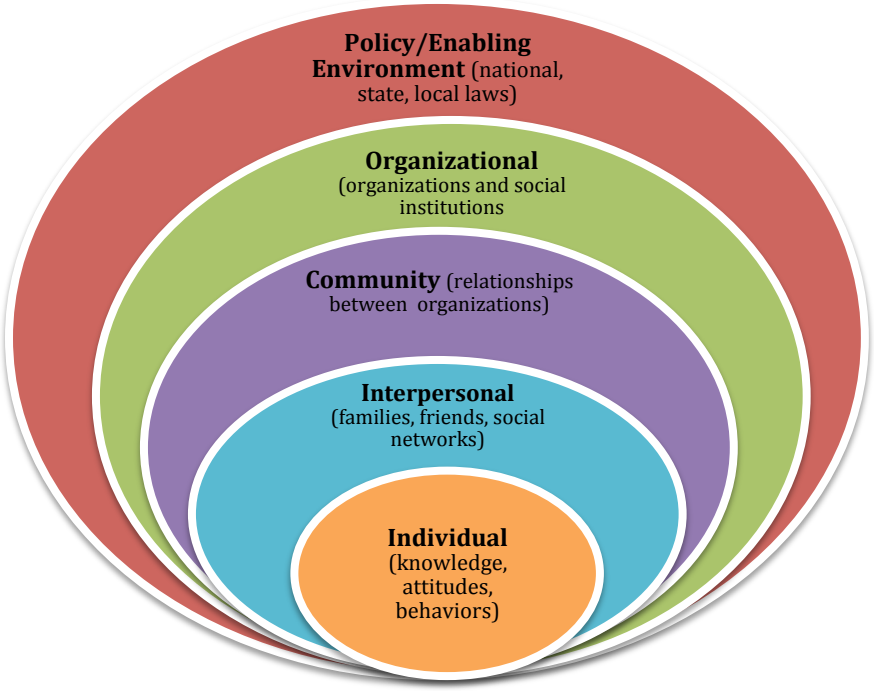
socialisation theory. Bronfenbrenner's ecological approach defined human development as the process by which the individual acquires a deeper understanding of the surrounding environment, and encourages him/her to participate actively in actions concerning this environment. In addition, it enables individuals to maintain or restructure their environment at different levels including micro, meso, exo and macro systems which constitute the settings and life space(s) within which an individual develops (Bronfenbrenner, 1979). Moreover, Bronfenbrenner's model emphasised the ontogenic development, which viewed the individual as moving through time and being influenced by his developmental and life course experiences (Bronfenbrenner, 1979).

According to this model, the micro system constitutes the immediate environment that the subject experiences, ensuring direct and face-to-face contact exchanges, the meso system comprises of processes and linkages between two or more micro-systems that contain the developing individual, for instance, the relationship between the family and the healthcare environment, whereas the exo-system pertains to the linkages that may exist between two or more settings, one of which may not contain the individual but affects him indirectly nonetheless. Such places and people may include the parents' workplaces, the larger neighbourhood, and extended family members. Finally; the macro system is the largest entity that exercises significant influence on the individual, including cultural pattern and values as well as on political and economic systems (Bronfenbrenner, 1979; Worthman, 2010).

Borrowing from Bronfenbrenner's model, McLeroy et al. (1988) extended the model and introduced its application in public health investigations. McLeroy's social ecological model of health promotion emphasises the nature of a subject's interactions with their social, cultural and physical environments (McLeroy et al., 1988). It is rooted in certain core concepts or fundamental principles that are critical to understanding its application to health behaviour

change, as follows: a) the environmental and individual factors that influence health behaviour dynamically interact with each other; (b) people and environments are multidimensional and complex; (c) people and environment interactions exert multiple levels of influences; and d) and behaviours are viewed as a the consequence of reciprocal causation unfolding at multiple individual and environmental levels of influence (Stokols, 1992; Stokols, 1996; McLaren and Hawe, 2005).

In contrast to Bronfenbrenner's micro, meso, exo and macro systems, the social ecological model of McLeroy et al. (1988) views behaviour as being determined by five nested hierarchical levels: i) intrapersonal, ii) interpersonal, iii) institutional, iv) community, and v) public policy factors (Figure 8). This model shifted away from solely blaming individuals as being totally responsible for their health behaviours; instead the model identified an entire interrelational system of forces that surrounds each individual with factors that can influence their behaviours (McLeroy *et al.*, 1988; McLaren and Hawe, 2005; Richard, Gauvin and Raine, 2011). In this way, the model helps researchers explain behaviours contextually, which can be important in identifying barriers to and facilitators of behavioural change. Therefore, the social ecological model of McLeroy et al. (1988) was used in this study as a theoretical lens to help understand the perceived barriers to and facilitators of the adoption of healthy lifestyles among Saudis after CVD diagnosis. Table 2 provides a brief description of each of the social ecological model levels.



Source: Adapted from the Centers for Disease Control and Prevention (CDC), The Social Ecological Model: A framework for Prevention (retrieved on December, 2018)

Figure 8 McLeroy et al. (1988) Social Ecological Model

Table 2 Description of the social ecological model levels of McLeroy et al., (1988)

Level of influence	Description
Intrapersonal or individual	• The characteristics of an individual that influence the acquisition of behaviour including knowledge, attitude, skills, gender, age, religious identity, personal beliefs, values, self-concept and developmental history.

Interpersonal	• The formal and informal social networks and primary groups that provide social identity, support and role definition including family members, friends, work colleagues and peers.
Institutional or organisational	• Social institutions with organisational characteristics and formal and informal rules, regulations and policies for operation that affect how, or how well services are provided to an individual or group; such as healthcare facilities or schools
Community factors	• Relationships among organisations, institutions and informal networks within defined boundaries; such as culture and social norms. Community factors also include the built environment, community leaders and transportation.
Public policy	• Local, state and national laws, policies and procedures that regulate or support healthy actions and practices for disease prevention, early detection, management and control.

Irrespective of the level considered, the surrounding environment affects the development of each individual, shaping his/her behaviour from early years (Richard, Gauvin and Raine, 2011). For the present study, the environment is considered mainly through the prism of the interpersonal, institutional and community levels. That said, the study attempted to explore Saudi cardiac patients' attitudes toward adopting healthy lifestyles by considering factors connected to their family background and their healthcare settings, as well as the broader cultural and social systems influencing each patient's life (McLeroy *et al.,* 1988).

4.2.5.1 Rationale for selecting the social ecological model as the study's theoretical framework

The review of literature reveals that Integrating and conceptualising the environment, amid other influences on behaviour, are key features of the social ecological models that have been applied in public health research (Fisher 2008; Richard *et al*., 2011). Further, the social ecological model in health promotion conceptualises reciprocal causative relationships between individuals and their environment and suggests multilevel assessment of the interplay between personal attributes and environmental factors (McLaren and Hawe, 2005; Sallis, Owen and Fisher, 2008; Worthman, 2010; Richard, Gauvin and Raine, 2011; Wold and Mittelmark, 2018). It has been argued that examining health behaviours at multiple levels prevent researchers from focusing on a single aspect of influence, and thus providing a thorough picture of the relations between different levels of influence (Sallis, Owen and Fisher, 2008; Richard, Gauvin and Raine, 2011). This specific feature offers the rationale for selecting the social ecological approach of McLeroy et al. (1988) as a theoretical lens for this study.

Using the social ecological model as a framework in this study offered an important advantage over other psychosocial models and theories that primarily focus on individual level factors such as the health belief model (Becker, 1974), transtheoretical model (Prochaska and Velicer, 1997), theory of reasoned action (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980) and theory of planned behaviour (Ajzen, 1991). The choice of an ecological approach for this research is further justified in this study by the ability of this model to address the complexities and interdependencies between socio-economic, cultural and environmental determinants of behaviour, whilst also acknowledging the importance and impact of individual level factors (Stokols, 1992; Sallis, Owen and Fisher, 2008; Richard, Gauvin and Raine, 2011). In

addition, it is argued that this model is best suited for understanding factors about which people are unaware and do not perceive as reasons for their behaviours, yet which influence their lifestyles (McLaren and Hawe, 2005; Koshoedo *et al.*, 2015). Thus, in this research, the social ecological model prescribed by McLeroy *et al*., (1988) offered a comprehensive approach for examining the existing individual, social, environmental and cultural influences that facilitate or hinder lifestyle changes among Saudis living with CVD. This approach will also guide the future development and designing of an intervention programme promoting healthy lifestyles among Saudis living with CVD. Multifaceted interventions that feature individual and environmental components are more likely to be successful in promoting health than interventions with a narrower scope (Worthman, 2010; Wold and Mittelmark, 2018) (Wold and Mittelmark, 2018; Worthman, 2010). A detailed discussion of the implication of this study is presented in Chapter 8.

Moreover, the use of the ecological approach is aligned with the philosophical assumptions of the qualitative inquiry design adopted in this study in that the model suggests that environments consist of multiple dimensions that interplay between personal and environmental factors. As noted by Miles (2014), most qualitative studies lie somewhere between a loosely structured, emergent, inductively grounded method and a deductive, confirmatory technique. It has been argued that qualitative inquiry is congruent with the new paradigm for health promotion that emphasises a holistic and ecological approach to health and health-related behaviour, such as the model offered by McLeroy et al. (1988) model. Key informants' questions for the study were guided by the core concepts of the social ecological model to ascertain individual, interpersonal, societal, and environmental spheres of influence related to lifestyle behaviour change and are presented in appendix 8. Examining the multiple realities associated with culture, social and environmental contexts provided insights into the multiple levels of influence on lifestyle behaviours among Saudis living with CVD.

As the theory relates to this study, lifestyle behaviour change in cardiac patients is understood within the environment in which that individual patient operates, such as the family, healthcare services and the community. Successful intervention to change lifestyle behaviours would need to be informed by individual characteristics, characteristics of the environment, and the influence resulting from the interaction that takes place in this reciprocal relationship. The social ecological orientation posits that what matters for behaviour change and development is how the environment is perceived. The next section reviews and synthesises the use of the social ecological model in empirical research studies investigating lifestyle behaviour change.

4.2.5.2 Empirical research studies on lifestyle behaviour change and the social ecological approach

Studies supported by the social ecological approach that explore the influences of lifestyle behaviours among Saudis living with CVD do not currently exist. However, it is of importance to note that this model has been applied to research into various health promoting behaviours across various populations and been used by various disciplines to explain numerous health problems. The social ecological model has also served as a basis for designing policy, therapeutic, and educational interventions (Kowal and Fortier, 2007; Herrera *et al.*, 2011; Rhodes and Nasuti, 2011; Townsend and Foster, 2013; Simon *et al.*, 2014; Chastin *et al.*, 2015; Koshoedo *et al.*, 2015; Glomjai, 2016; Aittasalo *et al.*, 2017).

In a study applying the social ecological model of McLeroy et al. (1988) to evaluate the association between various levels factors and secondary school students' dietary choices using questionnaires in the UK, researchers found that students interpersonal factors (social environment) had a greater

association with their dietary choices than students' intrapersonal characteristics (personal traits). Whereas organisational factors (schools rules and policies) appeared to have a greater association with students' unhealthy food consumption than interpersonal and intrapersonal factors (Townsend and Foster, 2013). The authors concluded that using the social ecological model and multilevel analysis allowed them to uncover how students' reported factors were associated with the choice of different foods at different times of the day. That information can be vital for informing interventions to target specific correlates and change health outcomes in schools.

The social ecological model has also been utilised to understand the complex interplay of barriers to physical activity amongst black and minority ethnic groups (BME) in the UK; with researchers using qualitative synthesis methods (Koshoedo et al., 2015). The synthesis indicated that barriers to physical activity were influenced by the BME individuals' perceptions, cultural expectations, personal barriers and factors limiting access. The authors suggested that using the social ecological approach as a lens throughout the synthesis is a strength of this study because it facilitated the conceptualisation of the identified barriers at individual, physical environment and organisational levels. This conceptualisation provided fuller understanding of the experiences of this population and offered an insight into developing tailored effective health promotion interventions to address low physical activity participation among BME individuals. A further study conducted by Waites (2013) explored perceptions, preferences, and practices regarding physical activity and healthy diets among African American older adults through a social ecological lens. This approach provided an integrated view of older adults' health promotion environments, in terms of cost, transportation, and access to resources, as integral to maintaining their health while aging. The author further proposed the suitability of using this approach when investigating marginalised and vulnerable populations, since understanding ecological interactions helps to provide a fuller picture of the determinants of

health promotion (Waites, 2013). Hence, utilising the social ecological model in contexts where cultural and religious behaviours form the cornerstone of societal behaviour, as in Saudi Arabia, provided thorough and broader understanding of the interplay among multilevel and interactive factors that impact on the adoption and maintenance of healthy lifestyle behaviours; which the present study attempted to provide.

In addition, the social ecological model has been increasingly utilised to synthesise the literature on lifestyle behaviour. For instance, Nelson, Abbott and mcdonald (2010) adapted Lynch's social ecological approach (Lynch, 2000) as an organising framework to synthesise the engagement of indigenous Australians in physical activity routines. The authors concluded that applying the social ecological model can be a valuable tool for understanding and promoting physical activity engagement among a different range of populations (Nelson, Abbott and Macdonald, 2010). The main reason for this conclusion was because culture is appropriately considered an important structural and social factor within the model. Elsewhere, Chastin (2015) conducted a systematic literature review to summarise current evidence on potential factors associated with sedentary behaviour in older adults; research guided by the tenets of the social ecological model. Age, level of education, employment status and obesity were reported as consistent correlates of sedentary behaviour which all considered as personal factors. The authors argued that the use of the social ecological model helped identifying paucity of research into potential non-personal or contextual determinants of sedentary behaviours (Chastin, 2015). It was therefore suggested that future research should investigate not only individual but also contextual variables such as interpersonal, built or physical environmental and policy determinants, according to the social ecological models of health behaviour. Such dimensions of exploration are the main reasons the social ecological model was utilised as a theoretical framework in this current study.

Finally, even within recent research, the social ecological model has been used as a guide for the development of interventions promoting lifestyle changes. One such study is by Aittasalo et al. (2017) who developed an intervention based on the social ecological model (McLeroy et al., 1988) to promote active commuting to work in Finland. The intervention integrated different environmental, social and behavioural strategies to promote active walking habits. This intervention involved collaboration with an interdisciplinary group of practitioners in the fields of transportation, urban design, physical and sustainable development using a randomised controlled design. The authors argued that the social ecological model offered different pathways and levels to reach population groups which may be unconnected or under-represented by single-level interventions. Further, the use of such a model facilitates the development of practices to promote active walking at both environmental and work-place levels (Aittasalo *et al.*, 2017). Likewise, a social ecological approach was developed to promote physical activity and limit sedentary behaviour in adolescents using a randomised controlled trial of 8 schools resulted in the prevention of excessive weight gain for up to 30 months after intervention's cessation. The study concluded that long lasting weight control and reduction effects in adolescents can be promoted using multilevel approach such as that offered by using the social ecological approach (Simon *et al.*, 2014) .

4.3 Conclusion

The social ecological model has been demonstrated as able to provide an appropriate framework to guide a variety of studies aiming to investigate the influential factors towards healthy lifestyles, in order to apply interventions promoting lifestyle behaviour change. However, most of the studies were conducted using a quantitative methodology, focusing on pre-identified factors. Therefore, a more in-depth investigation on factors that influence

lifestyle change behaviour utilising qualitative methodology is needed, using the social ecological model to inform and guide research initiatives. Such an investigation was conducted in this study, within the Saudi context. Justification for selecting the social ecological model as a lens to explore the factors that influence the adoption of healthy lifestyle among Saudis living with CVD is presented. The justification is supported by critical analysis of the empirical studies that have adopted the ecological approach as a framework to investigate lifestyle behaviour. In the next chapter, details regarding the aim and objectives of this study, justification of the adopted methodological approach, research design and the methods used to collect and analyse the data, are all discussed.

Chapter 5 – Methodology and Research Design

5.1 Introduction

This chapter documents the process of designing this research study and outlines the chosen methods with a justification for each choice. It starts with reflections on the formulation of the research aims and objectives then goes on to provide a rationale for selecting the research philosophy that underpins the adoption of qualitative methodology based on the theoretical perspective of the social ecological approach. Justification for using in-depth interviews as a data generation method along with sampling techniques, recruitment and access processes are discussed. This is followed by a detailed explanation of the process of analysis. Lastly, the ethics of the project as well as strategies to enhance the rigour of the study are considered.

5.2 Purpose, aim and objectives of the study

5.2.1 Purpose and study aims

The background (Chapter 2) and literature review (Chapter 3) highlighted the state of CVD in Saudi Arabia and emphasised on the impact of lifestyle intervention on limiting the progression of the disease. However, changing lifestyle behaviour is a very complex process, which is influenced by a multitude of factors including social norms, cultural values and beliefs and structural constraints (Astin, Horrocks and Closs, 2014). Understanding the factors that promote or hinder lifestyle changes at the individual, societal and institutional levels among Saudis is very crucial to design contextually based preventive interventions targeted at this population. However, the effects of these factors on lifestyle changes in the context of Saudi population living with CVD are largely unknown. To address this gap in research, the aim of this study was generate an in-depth understanding of the factors that influence the

adoption of healthy lifestyles among Saudis after CVD diagnosis. Underpinned by the social ecological model (McLeroy et al., 1988), this study explored the individual and contextual factors such as culture, values, beliefs and knowledge that affect the ability of Saudi living with CVD to make lifestyle changes.

5.2.2 Research objectives

1. To understand the reported factors that promote or hinder the adoption of healthy lifestyle and the ability to follow recommended guidelines among Saudi who have been diagnosed with CVD.
2. To explore reasons that secondary prevention guidelines and teachings are not effective in changing health related behaviours of CVD patients.
3. To gain insights and understanding from patients about how their holistic care might be improved and uncover their unmet needs to make lifestyle changes.
4. To explore ways of improving care and make recommendations (based on patient views) for clinical and policy development.

5.2.3 Research Questions

To explore the individual and contextual factors that affect Saudis living with CVD to make lifestyle changes, four research questions were posed:

1. What are the perceived individual factors that promote the adoption of healthy lifestyle for Saudis after CVD diagnosis? (Objective 1)
2. What are the perceived contextual factors that promote the adoption of healthy lifestyle for Saudis after CVD diagnosis? (Objective 1)
3. What are the perceived individual factors that hinder the adoption of healthy lifestyle for Saudis after CVD diagnosis? (Objective 1 – 2 – 3)

4. What are the perceived contextual factors that hinder the adoption of healthy lifestyle for Saudis after CVD diagnosis? (Objective 1 – 2 – 3 – 4).

5.3 Philosophical assumptions

A variety of different approaches exist to gain knowledge within the social inquiry. How researchers proceed with their inquiries depends upon a range of factors, including their belief about the nature of existence in the social world (ontology), the nature of knowledge and how it can be acquired (epistemology), the aim and goals of the research, the characteristics of research participants and the position and background of the researchers themselves (Crotty, 1998; Holloway and Wheeler, 2010; Flick, 2014; Crotty, 2015; Denzin and Lincoln, 2017). Ontology, as the nature of reality, and epistemology, as the theory of knowledge, are the two leading concepts that identify the basis of any research methodology (Crotty, 2015).

Ontology is concerned with the nature of reality and what there is to know about the world (Crotty, 1998). Key ontological question concerns whether or not there is a social reality existing, independently of human interpretations and beliefs (Blaikie, 2017). The two overarching ontological positions in relation to this issue are realism and idealism. Realists claims that an external reality exists independent of people's beliefs or understanding about it. Whereas idealists assert that no external reality exists independent of our beliefs and understandings (Blaikie, 2017; Hughes, 1997). According to Crotty (2015), qualitative researchers vary in their ontological stances, but there is a common understanding that the social world is governed by shared understanding and normative expectations, and thus the laws that govern it are not fixed. This study conceptually supports that reality exists in the social world and waits to be discovered through a socially constructed meaning. The

social constructionism approach supports that both social structure and individuals interact together to form the causal efficacy of a social phenomenon (Elder-Vass, 2012). Since social norms and values exert a significant influence on Saudis behaviour, considering the influence of the social structure as well as the individual capacity that are advocated by the social constructionism approach is vital.

Epistemology, on the other hand, is concerned with ways of learning about the world and what forms the basis of our knowledge (Blaikie, 2017). In very broad terms, there are two main philosophies of gaining knowledge that have influenced the development of social research, the natural science and the interpretive model (Crotty, 2015; Blaikie, 2017). The natural science model is positivistic in nature and driven by objective epistemology, dictating that reality can be studied and reported directly (Crotty, 2015). Bryman (2012) claims that positivists follow their natural science approach by testing theories and hypotheses. The quest for objectivity and distance between researcher and material studied is one of the most important characteristics of this approach (Bryman, 2012). Quantitative approach has its roots in the positivist and early natural science model and answers 'how many' questions. Quantitative methods concerns with statistical associations and make suggestions of probability and likelihood but does not necessarily unpack how or why a particular phenomenon has arisen (Blaikie, 2017). For quantitative researchers, reality is seen as objective reality or fact, which is stable and independent from time and context (Neuman, 2014). Positivists believe that the methods of natural sciences are appropriate for social enquiry because human behaviour is governed by law like properties; and hence it is possible to carry out objective, independent, and value free social research (Crotty, 2015). Consequently, this study could not be accomplished using a positivistic approach, as the exploration of the factors associated with cardiac patient decisions towards health behaviour change demand an in-depth investigation

and deeper understanding that can only be offered by exploring the research phenomenon from the participants' perspectives, taking into account both behavioural and accompanying sociocultural factors.

The interpretive model, in contrast, centres on the way in which human beings make sense of their subjective reality and study the meanings behind actions (Crotty, 1998). Interpretive researchers argue that understanding human experience is as important as focusing on explanation, prediction or control (Bryman, 2012). They further claim that complete objectivity and neutrality are impossible to achieve because the social world is not governed by regularities that hold law-like properties. Instead research is influenced by the pre-existing world perceptions of the researchers. Therefore, natural science methods are not appropriate for social investigation (Bryman, 2012). Thus, interpretivism proposes that we abandon the search for generalisable truths and laws about human behaviour and concentrate instead on better understanding, which can only offered by exploring the social world through the participants and their own perspectives (Bryman, 2012; Blaikie, 2017; Creswell, 2013). Qualitative research is largely associated with interpretivism and has reflected this in the use of methods that attempt to provide a holistic understanding of research participants' views and actions in the context of their lives (Creswell, 2013; Flick, 2014).

Interpretivism covers a broad range of different philosophical approaches, or traditions, among which are constructionism, symbolic interactionism, ethnomethodology, that are all loosely concerned with understanding social phenomena from the perspectives of those involved. Thus, in this approach, knowledge takes the form of explanations of how others interpret and make sense of their day-to-day life and interactions (Seale *et al.*, 2004). Constructionism approach in particular emphasises that knowledge is actively

‘constructed’ by human beings, rather than being passively received by them (Blaikie, 2017). Crotty (2015) goes further to add that in the constructionist view, meaning is not discovered and simply imprinted on individuals but constructed and formed through engaging with others and by the social and cultural norms that operate on their lives. Central to constructionism is the notion that knowledge is created by the interactions of individuals within the society. In other words, for constructionists, knowledge is not what individual believe, but rather what social groups believe. However, this position does not mean that people do not have ideas, instead people’s ideas are ultimately given meaning by their social context (Schwandt, 2007).

Whilst it may not be necessary to fully subscribe to one epistemological or ontological position, it is important to be clear about the approach used because the choice of research methods employed to collect and analyse data demonstrates the positions that researchers take in terms of how they see reality and how knowledge is built (Blaikie, 2017). With regard to this study, a constructionist approach within interpretive perspective was adopted to uncover the factors that influence Saudis decisions to adopt healthy lifestyles after CVD diagnosis. This approach facilitated an in depth understanding of Saudis views on what cultural, social and environmental influences help or hinder changes in their lifestyles after their diagnosis of cardiac disease. This approach valued the context surrounding individual accounts and did not allow the complexity of the philosophical debates to constrain the research agenda and the possibility of commenting on the phenomena (Crotty, 2015). It also allowed an exploration of the individual experience while giving weight to the social and contextual structures influencing people behaviours, thereby facilitated comprehensive understanding.

Alongside the two polarised perspectives of acquiring knowledge, positivism and interpretivism, several key issues dominate epistemological debate in social sciences. The first relates to the way is which knowledge is acquired, or as Blaikie (2017) call it 'logics of enquiry'. One view holds that knowledge is acquired through induction; a process in which evidence is collected first then the theories and knowledge are built from this evidence. In contrast, those who view knowledge acquisition as deductive process, develop hypothesis first and then evidence is collected to confirm or reject it. Although qualitative research is often portrayed as an inductive process, Blaikie (2007), among others, claim that there is no pure induction or pure deduction. They argue that inductive researchers cannot approach their data with blank mind. Instead the kind of data they generate is influenced by assumptions deductively derived from existing literature and their knowledge of the field, even if they are not testing a hypothesis. Likewise, deductive researchers testing hypothesis will have drawn upon a theory, which in turn has been inductively derived from observations (Denzin and Lincoln, 2017).

In light of this complexity, Blaikie (2007) goes on to introduce two further logics of enquiry into the social world; retroduction and abduction. In retroductive logic, the researcher identifies different mechanisms that have produced patterns in the data and tries to find a different fit. Abductive logic, on the other hand, is a strategy unique to qualitative research and involves abducting a technical account from participants' own accounts of everyday ideas and beliefs using the researchers' categories. In other words, abduction refers to a creative process aimed at producing new theories and hypothesis based on surprising research evidence (Blaikie, 2017). It is argued that abduction facilitates forming associations that enable the researcher to discern relations and connections that are not otherwise evident or obvious. This in turn allows the researcher to identify data that are beyond the initial theoretical premise (Meyer and Lunnay, 2013). Tavory and Timmermans

(2014) further advocate for adopting an abductive approach to balance theory construction and observation and provide a way to think about research that nurtures theory formation, without locking it into predefines conceptual boxes.

In regards to the current study's position on the logic of enquiry debate, the study located itself at the abductive strategy within the inductive-deductive continuum. This position is reflected in ways in which data was analysed and interpreted. At the start of the research project, an existing theory, the social ecological model (McLeroy et al., 1988), was used as a lens to help design the study and develop the fieldwork tools. In early analysis however, the focus was to keep the interpretation heavily grounded in the data and obtain as much detail as possible (Ritchie *et al.*, 2014). Towards the end of the analysis, the findings were placed back at the wider context of theory and existing knowledge. Using abductive logic facilitated emergence of knowledge that cannot be gained through pure induction or deduction (Tavory and Timmermans, 2014). Being clear about the approach used allowed the analysis to be interpreted in a way that is meaningful. Thus, producing a good quality as well as rigorous design and analysis.

5.3.1 Adopting a qualitative approach

When planning and designing this study, it was important to explore and consider all possible approaches and methods that best answer the research questions and fit well with the research philosophy, in order to produce a sound study design possessing integrity and rigour. A qualitative approach has become accepted as valuable in medicine and clinical practice to answer certain research questions (Bryman, 2012). In contrast to quantitative inquiry, qualitative inquiry answers the questions of 'how' and 'why' and gives credence to the social and cultural context that quantitative research

considers a confounding variable (Neuman, 2014). Rather than attempting to correlate predefined variables using a quantitative study, Sandelowski (2004) advocates for using qualitative research as a way of understanding causal explanations that could be based on individual interpretations and explanation or by observing the causal process of the specific events and circumstances. In order to understand how and why participants living with CVD engage in healthy lifestyle activities or why they don't, we need to understand the social world of participants, their personal experiences of living with CVD, the meanings they link to such experiences, and the discourses and practices concerning these issues in their contexts. Qualitative methods are appropriate for this purpose because they elucidate personal perspectives and contextual meanings of events, processes and structures (Miles, 2014).

Because quantitative research methods do not provide insight into the social context of meanings associated with behaviour, Silverman (2013) asserted that qualitative approaches are more appropriate when the purpose of study is to gain an understanding of the subjective experiences of the participants. A qualitative study assists in defining the concepts relating to the experience of the participants and determines how people behave and what they actually mean when they describe experiences and make decisions about their actions (Silverman, 2013). Denzin and Lincoln (2017) also argued for a shift in inquiry methods and posited that qualitative research provides a superior model to traditional health research because it leads to understanding in deeper and richer terms, which is rooted in a given respondent's set of circumstances.

The importance of this approach is that it brings together the different aspects of illness experience, from how illness is managed and its effects on daily life to how participants make lifestyle choices. Such insights help to improve the

understanding of the meaning and significance that the individual attaches to illness and the effects on health behaviour (Huberman and Miles, 2002). It thus is essential that research regarding participants' perceived barriers and facilitators to adopt healthier lifestyles addresses their subjective life worlds in order to understand their health and health behaviour as social products (Holloway and Wheeler, 2010). In addition, knowledge about the barriers and facilitators to lifestyle behaviour change among Saudis has evolved largely through positivist approaches, and therefore is based on what researchers perceive as important factors (AlQuaiz and Tayel, 2009; Midhet, Al-Mohaimeed and Sharaf, 2010; Al-Hazzaa Hazzaa *et al.*, 2012; Al Moraie, Lietz and Seal, 2012; Alquaiz *et al.*, 2014; Majeed, 2015; Al-Bannay *et al.*, 2017; Alissa, 2017). The use of traditional positivist methodologies may also oversimplify the notion of factors because they do not allow for the exploration of the impact of psychosocial and sociocultural context on lifestyle behaviour. Qualitative methods are appropriate for this purpose because they elucidate personal perspectives and contextual meanings of events, processes and structures (Miles, 2014). As an approach to understanding human behaviour, qualitative research allows for the discovery of a range of factors and underlying processes perceived to be relevant by the patients themselves. Lincoln (1992 p. 383) also argued for a shift in healthcare inquiry methods and posited that qualitative research provides a superior model to conventional health research because it leads to understanding in deeper and richer terms, understanding that is rooted in a given respondent's set of circumstances. Employing a qualitative approach in the present study has helped in developing a conceptual understanding of the range of factors perceived by participants as barriers and facilitators to change their lifestyles after CVD diagnosis.

5.3.2 Theoretical framework

The main tenets of the social ecological model (McLeroy *et al.,* 1988) (Chapter 4 Section 4.2.5) were used to guide this study. There has been a substantial growth in the application of the social ecological model in public health research in the past two decades (Kowal and Fortier, 2007; Herrera *et al.*, 2011; Rhodes and Nasuti, 2011; Townsend and Foster, 2013; Simon *et al.*, 2014; Chastin *et al.*, 2015; Koshoedo *et al.*, 2015; Glomjai, 2016; Aittasalo *et al.*, 2017). This growth was accompanied by a shift in emphasis from individual focused to contextual focused determinant of health behaviour (Sallis, Owen and Fisher, 2008). This shift in emphasis stems from a growing recognition that most public health challenges are too complex to be fully understood from a single level of influence. Instead, it requires a more comprehensive approach that incorporates multiple level of influence such as that offered by the social ecological model (McLeroy *et al.*, 1988; Glanz, Lewis and Rimer, 1990. According to Stokols (1996), the social ecological perspective is not based on a single theory or discipline, but rather on a broad paradigm that draws from different fields of studies.

The Social ecological model is rooted in certain core concepts or principles which include: a) human behaviour has multiple levels of influences, often including individual, interpersonal, organisational, community and policy; b) social ecological model emphasise the dynamic interplay between these different levels and c) behaviours are viewed as a consequence of reciprocal causation unfolding at multiple individual and environmental levels of influence. (Stokols, 1992; McLaren and Hawe, 2005).

Borrowing from Bronfenbrenner's model, McLeory et al. (1988) extended the model and introduced its application in public health. Their social ecological

model of health promotion viewed behaviour as being determined by: i) intrapersonal (e.g. knowledge, beliefs and attitudes), ii) interpersonal (e.g. social networks, family and friends), iii) institutional (e.g. workplace environment, access to healthcare services), iv) community (e.g. social norms and informal networks), and v) public policy factors (local and national laws and policies) (McLeroy et al., 1988). Using the social ecological model prescribed by McLeroy et al (1988) as a framework to explore the factors that influence the decision of Saudis to engage and maintain healthy lifestyle offers an important advantage over other psychosocial models and theories that primarily focus on individual level factors, such as the health belief model (Becker, 1974), or the transtheoretical Model (Prochaska and Velicer, 1997) to list but a few.

The social ecological model addresses the complexities and interdependencies between socio-economic, cultural and environmental determinant of behaviour, yet acknowledges the importance and impact of individual level factors (Stokols, 1992). In addition, this model is best suited for understanding factors of which people are unaware and do not perceive as reasons for their behaviours, yet they influence their lifestyle. Thus, in this research, the social ecological model offered a comprehensive approach for examining the existing individual, social, environmental and cultural influences that facilitate or hinder lifestyle changes among Saudis living with CVD. As noted by Miles and Huberman (1994), most qualitative studies lie somewhere between a loosely structured, emergent, inductively grounded method and a deductive, confirmatory technique. It has been argued that qualitative inquiry is congruent with the new paradigm for health promotion that emphasises a holistic and ecological approach to health and health-related behaviour such as that offered by McLeroy et al. (1988) model (Whitehead, 2004; Arcidiacono, Procentese and Napoli, 2009). Further discussion about the use of the social ecological model and the rationale for selecting this model as the

study's theoretical framework is provided in Chapter 4 (Sections 4.2.5, 4.2.5.1, 4.2.5.2).

5.4 Sampling strategy

Sampling is an integral part of the research design because it determines the way research questions can be addressed, the usefulness of data collected and the analytic potential of the data (Bryman, 2012). A key characteristic of qualitative samples is that they are relatively small in size and does not seek to produce a sample that is statistically representative, but rather use prescribed sample criteria on the basis of known characteristics relevant to the research topic (Creswell, 2013). The selection of participants for the present study employed a purposive sampling strategy to recruit participants with widely variant experiences, backgrounds and cultures to reflect the diversity of the study population as fully as possible. In this sampling approach, participants are intentionally chosen because they have particular characteristics or features that will enable thorough exploration and understanding of the central themes related to the phenomenon under study. These may include socio-demographic characteristics, or may relate to specific factors such as experiences, behaviours and roles relevant to the research topics (Bryman, 2012).

Purposive sampling has two principal aims; the first is to ensure that all the key criteria of relevance to the subject matter are covered. The second is to ensure that enough diversity is included within each of the key criteria so that the impact of these characteristics can be explored (Creswell, 2013). There is a range of different approaches to purposive sampling including homogenous, heterogeneous, extreme case, and stratifies samples. Each of these approaches is designed to yield different type of sample composition

depending on the research aims and purpose. Heterogenous sample, or maximum variation sampling approach, was deemed most appropriate for this study as it offers a deliberate strategy to include participants with variable social characteristics which may affect individual's experiences of and attitudes toward the factors that influence the adoption of healthy lifestyles (Brinkmann, 2013). This approach consists of determining in advance some criteria that differentiate the participants, and then selecting participants that are quite different on the criteria. This variation aims at identifying themes that cut across the variety of participants and increase the likelihood that the findings will reflect different perspectives, which is ideal in qualitative research (Bryman, 2012; Creswell, 2013).

Adopting the principles of maximum variation sampling was considered carefully depending on the setting and the type of participants recruited. Decisions about the criteria used for selection of participants were made in the early design stages of the study. They were informed by the principal aims of the study as well as the literature review methods and the existing knowledge of the researcher about the field and context of study. The sample included participants who: a) represent different age within the specific age group of adults of the age of 35 and over; b) men and women; c) urban and rural; d) those with different educational and income levels; e) different employment and marital status; and f) those with varying length of time since diagnosis.

Initially, a consecutive sample of seven patients was collected due to time constraints. This sample informed the subsequent recruitment that attempted to diversify gender and age of participant and the length of time since diagnosis to better capture the potential differences in the issues discussed. Subsequently, more female patients and those with longer time of CVD

diagnosis were recruited. The sample grew as new issues raised in earlier interviews were opened up for exploration.

As the study progressed, theoretical sampling was employed to identify participants who could explore specific issues identified in early stages of analysis or to gather more information about specific aspects of the data that remained superficial (Mason, 2010). Theoretical sampling involves an iterative process that moves beyond initial sampling to expand the sample chosen for the study according to demographics or characteristics of the sample that are theoretically interesting to develop emergent themes (Bryman, 2012). Mason (2002) argues that the use of theoretical sampling approach helps to achieve maximum variation and in-depth understanding of the emerging density of the data. Theoretical sampling continued refining categories and themes emerged from dataset until sample saturation was achieved and no new information was needed. Categories were saturated when gathering fresh data no longer sparked new insights, nor revealed new properties of the core theoretical categories (Mason, 2002).

5.4.1 Study setting

The study was conducted in Jeddah, one of the largest cities in Saudi Arabia, with a population of approximately 4 million (CDSI, 2014). Many ethnolinguistic groups from all parts of Saudi Arabia reside in Jeddah, as it offers greater opportunities for work, education and health services, especially for rural residents (General Authority for Statistics, 2017). Participants were recruited from one large military hospital, King Fahad Armed Forces Hospital (KFAFH), and one specialist teaching hospital, King Abdulaziz University Hospital (KAUH). Both hospitals offer inpatient and outpatient cardiac facilities and healthcare services to patients free of charge. It seemed most beneficial

to recruit participants from cardiac rehabilitation centres, however, tertiary health services, including cardiac rehabilitation, are not yet available at any governmental or private hospital in Western region of Saudi Arabia (Ministry of Health, 2014b). Nonetheless, both hospitals provide comprehensive services, which include education and nutritional counselling.

KFAFH's cardiac centre was established in 2003 to meet the national need to cope with the increasing burden of CVD in Saudi Arabia. It is the most comprehensive secondary treatment facility for adult cardiac diseases in Western Saudi Arabia and the third busiest centre in the Kingdom. It offers free medical services primarily to Saudi Arabian armed forces and their dependents. However, cardiac services are offered to civilian citizens and expatriates who have no access to treatment at local or central hospitals. Most surgical cardiac patients from all parts of the Kingdom are referred to this institution for diagnosis and treatment of CVD. This medical eligibility criteria helped in recruiting sample with a variety of cultural backgrounds and income levels, especially those living in rural areas.

KAUH, on the other hand, started in operation in late 1976 as the first educational hospital in Saudi Arabia affiliated to the faculty of medicine. The hospital is committed to providing the best possible options for diagnosis and management of all diseases for all patients free of charge. The hospital has 845 beds with the addition of 157 beds dedicated for critical care units, including the coronary care unit and the surgical intensive care unit. Cardiac clinics at the outpatient department run on a daily basis to meet the high demand of CVD patients. Recruitment of patients from two hospitals yielded maximum variation in sampling.

5.4.2 Inclusion criteria

The inclusion criteria comprised participants who were: (a) adults of the age of 35 years and over, since this is the minimum average age of CVD prevalence worldwide (Benjamin *et al.*, 2019); (b) had a documented CHD diagnosis (confirmed by medical record) for at least 2 years (Myocardial infarction, unstable angina, or undergone Coronary Artery Bypass grafting (CABG); (c) able to speak Arabic (the national language of Saudi Arabia); and (d) willing to talk about and reflect on their experiences with the phenomenon under study. More severe cardiac condition, namely heart failure and cardiomyopathy, were excluded from the study on the basis that physical limitations would have major influences on lifestyle choices (Iqbal *et al.*, 2010). It is noteworthy that the length of time since diagnosis specified by two years was selected based on the established fact that the length of time since diagnosis may affect individual experiences with lifestyle change and give them time to attempt to modify their behaviours in their natural environment (Newson *et al.*, 2012).

5.4.3 Sample size

The sample size used in qualitative research methods is relatively small compared to those used in quantitative research methods (Creswell, 2013). This is because qualitative research methods are often concerned with collecting an in-depth understanding of a phenomenon rather than making generalisation of the information. The concept of saturation has been regarded as the most important factor to consider when making decisions on sample size (Morse, 2000; Mason, 2010; Dworkin, 2012). Saturation is defined as the point at which the data collection process no longer offers any new data to the issue under investigation (Mason, 2010). Other factors that may influence sample size are the aim of the study, the heterogeneity of the

population, the type of data collection methods and the available time and resources (Morse, 2000). For the present study, sample size followed the concept of sample saturation. Sufficient depth and meaningful description was achieved after interviewing twenty-one participants.

5.4.4 Recruitment process

Recruitment of potential participants took place at the cardiac clinics of both hospitals between July 2016 and January 2017. At these cardiac clinics, patients regularly attend their appointments to follow-up with their cardiologist after experiencing cardiac events. I, the primary researcher identified eligible participants with the assistance of the clinical teams, who then contacted the perspective participants by phone approximately a week before their scheduled appointments with their cardiologist and verbally delivered the study information. Having members of the clinic team make the initial contact as gatekeepers and deliver the study's information gave the potential participants time to consider participation and voluntarily decide if they want to take part in the study, minimising any sense of coercion (Shenuka and Douglas, 2016). This also enabled them to decline participation in the study to someone not directly involved in the research, and in this case no further contact was made (Guillemin *et al.*, 2017).

Potential participants who initially agreed to take part were given a research information leaflet on their appointment day by members of the clinical team to provide them with detailed information about the study (English Appendix 2; Arabic Appendix 3). Having health professional acted as gatekeepers of the study was eminently beneficial (Guillemin *et al.*, 2017). They made the initial approach credible and trustworthy, thus encouraging participation. Participants who were willing to take part in the study returned a reply slip to

the staff at the clinic, which they then delivered it to me. I then introduced myself to the participants and discussed the study further to determine whether they wished to participate. It was explained that the study involves a recorded single interview and stressed that people were under no obligation to participate and were free to withdraw at any time should they changed their minds. Assurance about anonymity and confidentiality of the collected information was also emphasised. If they agreed to participate, consent to take part in the interviews was obtained. Participants were asked to sign the form or place a thumbprint, if unable to write. Placing a thumbprint is a used method in Saudi Arabia offered for those unable to read and write with the presence of a literate witness (English Appendix 4; Arabic Appendix 5). A copy of the consent form was retained each by the participant and researcher. Following on from this, an agreed upon time for the interview was scheduled on the same day. Interviews took place at the same day of the follow-up appointment to enhance recruitment and avoid unnecessary effort and transportation costs to the hospital, especially for participants living in rural areas. I have explained the interview procedure and stressed that all the recordings and information collected will be kept secured and that only the research team will have access to the data. A flow diagram of the recruitment process is presented in Figure 9 below.

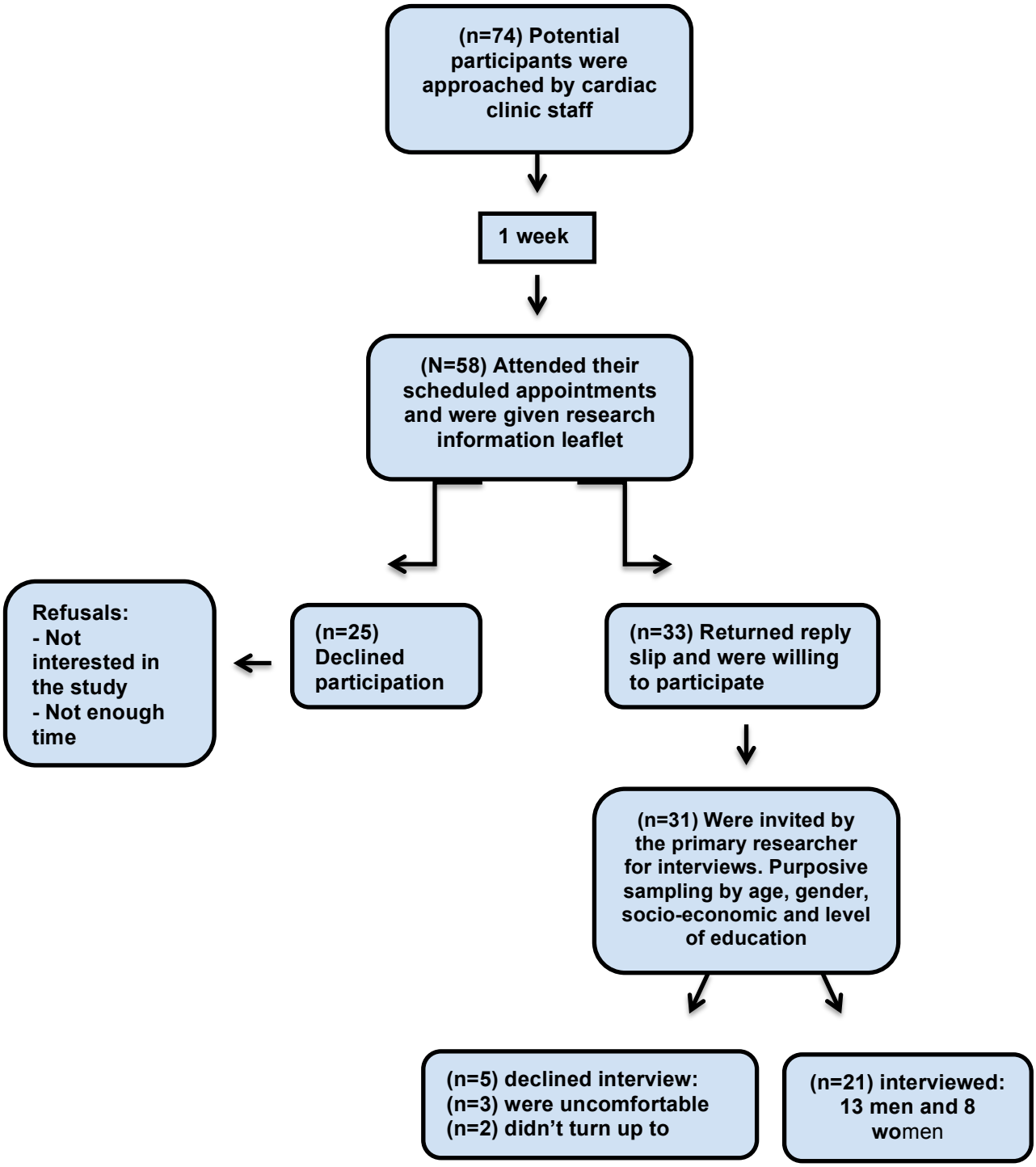


Figure 9 Flow diagram of the recruitment process

5.5 Methods/Design

Within a qualitative approach, there are a number of methods to choose from. Often researchers do not abide strictly with one method and apply terminology of different approaches variably (Crotty, 2015). To be consistent with the philosophical issues already considered, qualitative methods that are predominant with the constructionism paradigm were considered. Among which, qualitative interviews were used as the primary method to generate data. Reflexive notes were also used to augment interview data throughout the research process (Maharaj, 2016).

5.5.1 In-depth Interviews

Qualitative interviewing is a powerful way of helping people articulate their feelings and perceptions and make explicit things that have been implicit (Brinkmann, 2013). It offers an excellent instance of how respondents' attitudes toward a social phenomenon not only represent their own attitudes, but also those of their social group (Rubin and Rubin, 2012). In-depth qualitative interview, as the name implies, seek to obtain rich data to describe a setting and explain a phenomenon holistically and comprehensively (Rubin and Rubin, 2012). In-depth interviews are particularly useful when the research aims to shed a new light on a subject that is under explored, because they provide a way of uncovering and exploring the meaning underpinning people's lives, routines and behaviours (Brinkmann, 2013). With highly structured interview design, participants often answer what have been asked only without elaboration, making it difficult to obtain rich data on attitudes, opinions and values (Bryman, 2012). A semi-structured interview, on the other hand, allows participants to freely tell their stories and voice their own concerns in their own words without limitations (Rubin and Rubin, 2012).

Therefore, in-depth semi-structure qualitative interviews were selected as the main method of data generation for this particular study.

A key feature of one-to-one interactions is the depth of focus and the opportunity for detailed exploration of participants' individual perspective within the context of his or her own experience (Silverman, 2013). The intimacy of this type of interviews facilitated the discussion of sensitive issues around diagnosis, prognosis and personal beliefs, which yielded a personal account of participants' experience. The majority of participants opened up and shared very sensitive and personal stories, which is very unusual for the conservative nature of Saudi society, putting me in a privileged position of insight. However not all the participants were willing to discuss sensitive issue like income or financial abilities. As a Saudi researcher, I was aware that some of the topics covered during the interviews might be uncomfortable to be discussed with participants and needed to be addressed in a very cautious manner. I have, however, carefully maximised the preservation of the dignity of the interviewees and assured them of the complete anonymity of the data. Where participants felt uncomfortable with any questions they were able to move on to the next question.

Furthermore, semi-structured interviews allowed the topics discussed to be guided by the interviewees, enabling them to raise issues and shape the content of the interview, which was most suitable for a research exploring potentially sensitive issues (Rubin and Rubin, 2012). Moreover, open-ended questions were used as the standard tool of in-depth interviewing. This type of questions allowed responses to achieve both breadth of coverage across key issues, and depth of content within each issue (Ritchie *et al.*, 2014). Probing techniques were used throughout the interviews to elicit more information, description or explanation from participants about how they make decisions to

engage in healthy lifestyles, how successful they are in making these changes and what difficulties they face. The key feature of probes is that they relate directly to what has been already said, providing greater clarity, detail or depth of understanding (Rubin and Rubin, 2012).

Considering this benefit of individual interviewing, focus group was not considered an appropriate method of data collection for this study. While focus groups can be helpful for people who may benefit from the supportive environment, there was potential for upset if topics such as religious beliefs or social norms are raised that certain individuals were not comfortable to discuss. For Saudis in particular, personal experiences and lifestyle decisions are most likely seen as confidential, and group discussions around it may be seen as socially inacceptable. Furthermore, there was the risk of disclosures around issues such as prognosis and life expectancy, which some participants may not want to hear. In terms of institutional organisation needed to conduct focus groups, the lack of cardiac rehabilitation centres at the study settings inhibited my accessibility, as the researcher, to cluster the study population and have them meet at a common location for a face-to-face group discussion.

Of the twenty-six eligible participants invited to participate, twenty-one (13 men and 8 women) agreed to take part in the study. Interviews were conducted, in Arabic, to determine the participants' knowledge about healthy lifestyles, how successful they were in changing their lifestyles, and what were the facilitators and challenges or difficulties faced in adopting and maintaining healthy lifestyles. A summary of the demographic data and clinical characteristics of study's participants is presented in Table 3. Prior to conducting the interviews, I requested each participant to complete a demographic information sheet (English, Appendix 6; Arabic, Appendix 7).

Being a native Saudi Arabian and fluent in both Arabic and English, all data collection procedures were carried out solely by me, to ensure consistency and accuracy. Data collection and analysis occurred concurrently over the period of 8 months, between June 2016 and January 2017, and data collection was concluded when sufficient and meaningful depth of knowledge about the study phenomenon was achieved (Mason, 2010).

Table 3 Demographic data and Characteristics of the study participants

Demographic information	Male	Female	Percentage
Number of participants	13	8	• 100%
Gender			
• Male	• 13	• --	• 61.9%
• Female	• --	• 8	• 38.1%
Age			
• 30-40	• --	• 1	• 4.8%
• 41-50	• 2	• 2	• 19%
• 51-60	• 5	• 2	• 33.3%
• 61-70	• 4	• 2	• 28.6%
• >71	• 2	• 1	• 14.3%
Level of education			•
• None	• 1	• 1	• 9.5%
• Less than high-school	• 3	• 2	• 23.8%
• High school or equivalent	• 3	• 3	• 28.6%
• College graduate	• 6	• 2	• 38.1%
Marital Status			
• Single	• --	• 1	• 4.8%
• Married	• 13	• 5	• 85.7%
• Divorced	• --	• 2	• 9.5%
Source of income			
• Paid employment	• 6	• 2	• 38.1%
• Spouse/family friends	• --	• 3	• 14.3%
• Retired	• 7	• 2	• 42.8%
• Other (family inheritance)	• --	• 1	• 4.8%

Diagnosis • Myocardial Infarction • Unstable Angina • Coronary Artery Bypass Graft (CABG)	• 9 • 1 • 3	• 3 • 2 • 3	• 57.1% • 14.3% • 28.6%
Length of time since diagnosis • 2 – 5 years • 6 – 10 years • > 11 years	• 8 • 2 • 3	• 5 • 2 • 1	• 61.9% • 19% • 19%
Residence • Urban • Rural	• 11 • 2	• 7 • 1	• 85.7% • 14.3%
CVD risk factor • Diabetes Miletus • Dyslipidemia • Hypertension • Previous stroke • Family history • Overweight (BMI 25-29) • Obesity (BMI >30) • Smoking: ▪ Non smoker ▪ Previous smoker ▪ Current smoker	• 10 • 5 • 8 • 1 • 7 • 5 • -- • 4 • 8 • 1	• 5 • 1 • 4 • -- • 2 • 5 • 1 • 6 • 1 • 1	• 71.4% • 28.5% • 57.1% • 4.8% • 42.8% • 47.6% • 4.8% • 47.6% • 42.8% • 9.5%

5.5.1.1 Timing and content of interviews

The timing of interviews was guided by ethical considerations and the research agenda. As mentioned earlier, scheduling interviews with participants on the same day of their appointment was chosen to enhance recruitment and avoid unnecessary effort and transportation costs to the hospital, especially for participants living in rural areas. It was the participants' decision whether to schedule their interview before or after their appointments. Around 85% of the participants preferred to have it after they have seen their cardiologist as this would help them focus entirely on the

interview rather than worrying about their appointments. Interviews were held at one of the meeting rooms in the cardiac clinic that was booked earlier for conducting the interviews to avoid any interruptions to the interview. On average, interviews lasted between 35 to 80 minutes, and the participants determined the length of their interviews.

The topics explored were selected based on the existing literature around health behaviour change and the main tenants of the social ecological model (McLeroy *et al*., 1988). The questions were around participants' illness experiences, their knowledge of healthy lifestyles and how they make decisions to adopt healthy lifestyles. The interviews also covered the personal, cultural, educational, structural and financial influences on these decisions. Although I used an interview guide, there was flexibility in how and when the questions are put and how the participant can respond (McIntosh and Morse, 2015). I relied on the flow of interaction with the participants to steer the interview process by probing and constructing questions about the issues brought up as the interview progresses, rather than just asking predetermined specific type of question. This helped in eliciting stories from the respondents that resulted in deeper understanding of their experiences.

5.5.1.2 Interview guide

According to Marshall (2016), an interview guide serves the useful purpose of exploring topics comprehensively and systematically by keeping the interview focused on the desired line of action. It is commonly used in qualitative interviews to help ensure the right degree of consistency in generating data is achieved while allowing flexibility to pursue details and enhance interactions in a responsive way. For the present study, interview questions were guided by the core concepts of the social ecological model (McLeroy *et al.*, 1988) to

identify the individual, interpersonal, organisational, community and policy factors that determine the participants' health behaviour and how they interact at multiple levels of influence. Key topics were organised in the most logical way starting with introduction and contextual information to set the scene and ease participants gently into the topic. This was followed by the core part of interview where questions moved from general to more in-depth coverage of perceptions of barriers and facilitators to lifestyle change. Towards the end, it was important to wind down the discussion and end on a positive note including thoughts about the future, suggestions about how services could be improved, or advice for other people in similar situations. This helped participants to move away from any difficult feelings like anger and distress that discussion may have generated (Ritchie *et al.*, 2014).

The guide was pilot-tested on the first and third participants to ensure the participant's clarity on and understanding of language and concepts. A minor modification with the language use was undertaken after the interviews were piloted to gain more in-depth information, but was not significantly changed thereafter (Brinkmann, 2013). Piloting interviews also helped me to gain insight into the interview process and refine my interview skills before interviewing the remaining participants. The piloted interviews were included in the data analysis. Interview guides were also an important documentation of the fieldwork process and a tool used for discussion between the research team about the direction of data collection (Rubin and Rubin, 2012). The complete interview guide used for this study is presented in Appendix 8.

5.5.1.3 Recording and transcribing data

Interviews were audio recorded to capture the data with detail and authenticity and allow full attention to be devoted to listening carefully and responsive

questioning and probing. Recording interviews provides accurate and verbatim account of what has been said in far more detail than would ever be possible by note taking (Ritchie *et al.*, 2014). Due to the limited utilisation of qualitative methods in healthcare research in Saudi Arabia, it was expected that participants might be reluctant or even refuse to participate because of the recording method. To avoid this, I provided clear explanation of the reasons of recording, reassured the participants about confidentiality and data security, and explained in detail what would happen to recordings and transcripts after the study is completed during the sampling stage and at the start of each interview. Although two of the perspective participants declined participation because of the recording method, I was fortunate that after providing explanations of the reasons of recording, none of the participants who agreed to participate had any objections on using the voice recorder during the interviews.

For analytical and reporting purposes, each recorded interview was transcribed simultaneously with translation into English by myself, being a bilingual, immediately after the interviews. This was followed by a rigorous procedure of backward translation of the transcripts by an independent bilingual translator to verify the accuracy of translation and minimise the possibility of compromising data quality. Transcripts were anonymised by removing any indicators of participants' name or residence as well as any other names or identifiable places mentioned in the interviews (Orb, Eisenhauer and Wynaden, 2001). To preserve anonymity, each participant was identified by a pseudonym and a code on the demographic information sheet and the interview recordings and transcripts (Orb, Eisenhauer and Wynaden, 2001). Transcription was done in parallel with interviewing, and reflections from the transcribed data were used to influence the general structure of the subsequent interviews (Nes *et al.*, 2010).

After the transcripts were generated, I repeatedly listened to the recording again to compare it with the transcripts for accuracy of interpretation and translation, including meaning and intonation in as much detail as possible. During this process, notes in *Italic* were recorded to capture nonverbal behaviours by integrating reflexive field notes (Maharaj, 2016). Certain Arabic phrases used by participants during interview that has no equivalent meaning in English were transcribed verbatim to avoid loss of meaning in the translation process and the meaning was explained on the transcripts (Nes *et al.*, 2010). Transcripts had wide margins and adequate line spacing to allow for initial coding and note taking. Having the procedures of translation and transcription carried out solely by myself was a good opportunity to become immersed in the data, which was a vital stage later in interpretation (Ritchie et al., 2014).

5.5.1.4 Field notes

During data collection, I maintained a reflexive journal to record reflections on what I have seen and heard outside the context of the interview, as well as my thoughts about the dynamic of the data collection procedure to augment interview data. According to Silverman (2013), field notes provide the researcher with the means to capture the description of the setting, interactions of people, and their own understanding and interpretation of what is going on. They were comprised mostly of key points from interviews, including participants' non-verbal behaviours and emotions, and thoughts about how interview data relate to the wider context or existing literature. In addition, some issues relating to the interview setting or context, such as the presence of family member or interruptions by members of the clinical team that may have an impact on the flow of the discussion, were also recorded.

5.5.2 Researcher's reflections on data collection

By deciding to explore this topic, I was aware that there would be some sensitive issues that would need to be addressed in a very cautious manner. While conducting the study, particularly during the data collection process, there were two key challenges: one was the challenge to gain ethical approval for conducting the study because of the nature of the selected method of inquiry which requires interviewing patients in person and recording their narratives; and the other one with the sensitivity of the topics explored.

Ethical issues related to research in countries such as Saudi Arabia differ in many respects from those in developing countries. The ethical framework for research generally follows the ethical requirement to protect human subjects from Western perspectives, which might not directly apply to the Saudi context, such as face-to-face individual interview with a female researcher, signing of a consent form, and recording the interviews (Orb, Eisenhauer and Wynaden, 2001; Guillemin and Gillam, 2004). My experience in obtaining ethical permission from the hospitals' Bioethics Committee delayed the research for about two to three months. Unfortunately, healthcare institutions in Saudi Arabia are not habituated in the practice of conducting and recording interviews and sharing this type of behavioural issues because the majority of healthcare research is quantitative in nature. After initially denying my access to one of the hospitals, I requested to meet with the head of the Bioethics Committee to explain my research in details and address his concerns. I was fortunate to have had the chance to meet him in person and discuss the importance of this type of research in healthcare.

After gaining access, I still faced challenges with recruiting participants because of their lack of understanding of the importance of consenting and

recording interviews. This experience has given me an insight that in the Saudi society, individuals are not used to making decisions requiring informed consent because they think it is legally abiding. During the recruitment I also noticed that a few patients were willing and verbally consented to participate in the research, but when I asked them to sign the consent form, they refused to participate. Furthermore, family members accompanied few of the participants during interviews, and not only did the participants want their family members present during the interviews, but the family members also wanted to participate in the interviews. In the case family members participated in the interview, their participation was transcribed and highlighted.

Apart from the challenges of gaining access, there were some challenges relating to the elaboration and discussion of sensitive issues with the participants. I have already explained (Chapter 3, section 2.3.2) that the Saudi society is highly conservative and culturally Saudis do not feel confident in sharing personal behaviours that seem to be negative. In addition, those who participated were from different ethnic backgrounds with slightly different dialects. Using phrases or idioms from different dialects could have impacted the analysis of the findings, but when I asked the participants for an explanation of specific terms, they clarified them.

Moreover, gender differences were prominent during the interviews. Men did not wish to talk about their dietary practices because they believed that these are female concerns. Of those who participated, a few discussed other issues related to CVD and its causes, and keeping them focused on the research questions was a challenge. Furthermore, one rural female participant insisted on wearing her veil that covered her face during the interview, even though we were in a private place and no men were present, but I had to respect her

choice. As a result, her body language was impossible to observe. However, her interview yielded a rich understanding of the rural and urban differences in making lifestyle changes. I also observed that the participants behaved more openly within their own ethnic groups, for example when respondents from my own ethnicity were interviewed, they were very comfortable talking to me and sharing their experiences knowing that we were from same ethnic origin and I would understand their concerns. Before and during my data collection activities, I was therefore very careful in preparing my action plan. I fully explained my research objectives to the hospitals ethics boards and the research participants. Additionally, I had assured the anonymity and confidentiality of their participation details. I also admit that the dissemination of the findings of this research require additional consideration. Being a Saudi national I have tried to ensure that the thesis is respectful to Saudi culture, faiths and values. Besides, I have tried to be focused on the key objective of this study and provided a number of recommendations and guidelines to promote healthy lifestyles, which would enhance the acceptability of this study in Saudi Arabia (refer to Chapter 8 for the recommendations and implications of the findings).

To ensure the quality and rigour of the study, it was very important to maintain reflective journals about the interviews' context I described earlier. However, I also explicitly acknowledge any personal biases that could have influenced the research findings. Because I, as the researcher am the primary "instrument" of data collection and analysis, it is essential that I describe the reflexive dimension (Finlay, 2002; Dowling, 2006; Guillemin and Gillam, 2004; Jootun, McGhee and Marland, 2009). Further details about reflexivity are provided in section 5.9.1 of this chapter.

5.6 Ethical Issues and Access

Ethical consideration is central to high quality research practice and runs throughout the entire process of research from early stages of design to reporting the findings. Considering the nature of qualitative studies, the close interaction between the researcher and participant can raise a range of different ethical concerns. Therefore, following specific ethical principles and guidelines seems to be essential. According to Ryen (2011), the key and widely agreed ethical principles that should be taken into account when conducting a qualitative research to safeguard the rights of participants are: a) participation should be based on informed consent; b) participation should be voluntary and free from coercion; c) adverse consequences of participation should be avoided; and d) confidentiality and anonymity are preserved throughout the entire research process.

5.6.1 Informed consent

Informed consent is a core ethical issue and legal requirement for research involving interviews with human subjects (Marshall, 2006). In essence, potential participants were fully informed about all aspects of the research procedures to enable them to make informed decision and have freedom of choice to have their voice heard. The key information that was communicated to participants encompassed the purpose and aim of the research; that participation is voluntary and can be withdrawn at any time; and that participation involve one-time recorded interview for around an hour. Participants were also informed that data will be kept confidential and anonymity will be maintained throughout the research process.

Developing effective informed consent document required careful consideration of the language of participants as well as the social context of Saudi Arabia. I used lay language in developing the form to ensure the readability of the document and facilitate understanding of the content. This was done by replacing large and complicated word with smaller ones and using simplified words. It is argued that simplifying the content of consent forms improves the readability which in turns ensures that participants are fully familiar with the research procedures (Marshall, 2006; Ryen, 2011). Participants were asked if they need further clarification at each point before moving to the next.

Issues around capacity were not relevant to the participants as those experiencing cognitive deficits were excluded from the study. However, due to the prevalence of low literacy levels among older Saudi population, participants who were unable to give written consent due to literacy challenges were still included in the study. It is a common practice that illiterate people in Saudi use thumbprints to sign on legal documents and hospital forms. To ensure that participants fully understand the informed consent document, two additional steps were added to the consent procedure of participant with low literacy level. First, a witness selected by the participant and had no connection to the research team was asked to sign the consent form next to the participant's thumbprint to verify the accuracy of the reading of the document. Second, an audio-recorded verbal consent of the participant at the beginning of the interview reconfirming his/her voluntary participation was obtained. As Marshall (2006) argues, verbal consent is appropriate when risks associated with research are low and the potential harm for participants is very unlikely (Marshall, 2006). Which is the case for this study.

5.6.2 Avoiding adverse consequences

Although the concept of avoiding adverse consequences is particularly strong in the biomedical research context, it is important to recognise that particular features of qualitative methods can have an impact on the extent of adversity the participant may experience (Bryman, 2012). The proximity in relationship between the researcher and the participants and skilful probing questions during interviews can lead people to reflect and disclose very personal beliefs and feelings (Bernard et al., 2009). To tackle this issue and limit unintentional disclosure, I made it very clear to participants that it is their choice how much they can say. Participants were also told that they have the right to decline answering any question they don't want to answer and stop discussing any topic further. I was alert to non-verbal cues and signs of discomfort when potentially sensitive topics, like return to work and financial abilities, are discussed. I also gave participants time in interviews; paused if necessary and was very careful about introducing the topics. However, I found that most participants were willing to take part in interviews and expressed beneficial effects for themselves. Participants described a number of advantages including making sense of their experience; contributing to research; and helping other people affected by CVD by informing policy. There were two cases only where participants were emotional and didn't feel comfortable discussing sensitive issues. In such case, participants were offered access to helpful support services in the same hospital. The support service includes a session, or more if needed, with a psychologist who can then refer them to appropriate service within the hospital.

5.6.3 Anonymity and confidentiality

Ethics codes are clear that researchers should do everything possible to maintain the confidentiality and anonymity of their study participants (Ryen,

2011). Protecting the identities of the participants was achieved by keeping the digital recorder, notes and transcriptions secured in a locked cupboard and the audio files encrypted in a password-protected computer that can only be accessed by the researcher herself. Each participant was given a code number, which is assigned to his or her research data to ensure anonymity. Personal information such as names and contact information was stored separately from research data such as recorder, audio recordings and demographic sheets. In addition, the recording of the interviews will be erased and transcription files will be deleted after successful completion of the research project in accordance with the University of Edinburgh's Data Protection Regulation (GDPR, 2016).

5.6.4 Gaining access

Prior to conducting the study, it was necessary to gain approval from the institutional review board for data collection involved in the study. Equally important was to obtain local permissions to gather data from the selected recruitment sites. Obtaining access at an early stage in the research allowed gatekeepers and individuals in authority to assist in their endeavor (Creswell, 2013). Full ethical approval was granted by three institutional review boards: the Ethics Committee at the School of Health in Social Science, the University of Edinburgh; the Biomedical Ethics Research Committee at King Abdul-Aziz University Hospital; and Research and Ethics Committee at King Fahad Armed Forces Hospital – Jeddah. Copies of approval letters are presented in Appendix 9.

5.7 Analytic process

Analysis of in depth qualitative interviews was a complex process requiring close examination and exploration of the data in order to capture, portray and explain the social worlds of the people under study. As noted earlier, data analysis and collection occurred concurrently, which means that analysis did not began after finishing collecting data, but rather was an ongoing and inherent part of the whole research process (Silverman, 2013).

5.7.1 Framework analysis

The study adopted the framework analysis approach prescribed by Ritchie and Spencer (1994) to manage and analyse qualitative data. The framework analysis sits within the family of thematic analysis, but attempts to go beyond surface description to more abstraction and interpretation (Ritchie *et al.*, 2014). The main tenants of the framework analysis rest on being a substantive approach that moves from data-driven descriptive to more abstract themes; may attempt explanation; and does not report quantification (Gale *et al.*, 2013). Adopting framework approach in this study facilitated rigorous analysis that remained grounded in the data by allowing emergent ideas, concepts and patterns to be captured rather than being simply superimposed. Substantive approaches to data analysis, such as thematic analysis and grounded theory, are concerned with what the text says and the meaning in the data (Gibbs, 2007).

Unlike grounded theory, the framework approach is not necessarily concerned with generating social theory, but can greatly facilitate constant comparative techniques through the review of data across the matrix (Gale *et al.*, 2013). In

addition, the framework analysis approach is not aligned with a particular epistemological, philosophical, or theoretical approach. Rather it is a flexible tool that can be adapted for use with many qualitative approaches that aim at generating themes (Ritchie *et al.*, 2014). Gale et al. (2013) argues further that although the framework approach seems obviously systematic, it has no allegiance to either inductive or deductive analysis, and where the research sits along this inductive-deductive continuum depends entirely on the research aims and questions. Accordingly, the analysis process offered by the framework approach fitted well with the research questions and the overall aims as well as the philosophical assumptions underpinned this study. Analysis, according to this approach, comprised of five main steps that are outlined below and illustrated in Figure 10 with a clear explanation of its application. These steps provided a clear pathway to the process of analysis and improved transparency in research design (Ritchie *et al.*, 2014).

5.7.1.1 Familiarisation

Becoming familiar with the interview using the transcripts and any contextual or reflexive notes was the first step carried out in the analytic process. During this stage, I thoroughly read and re-read each transcript and field notes, and listened back to all parts of the audio-recorded interviews to become familiar with the whole data set as well as identify the general patterns. This helped me immerse herself in the data and gain an overview of the substantive content. Doing this ensured that all categories and themes developed later were grounded and supported by the data (Ritchie *et al.*, 2014).

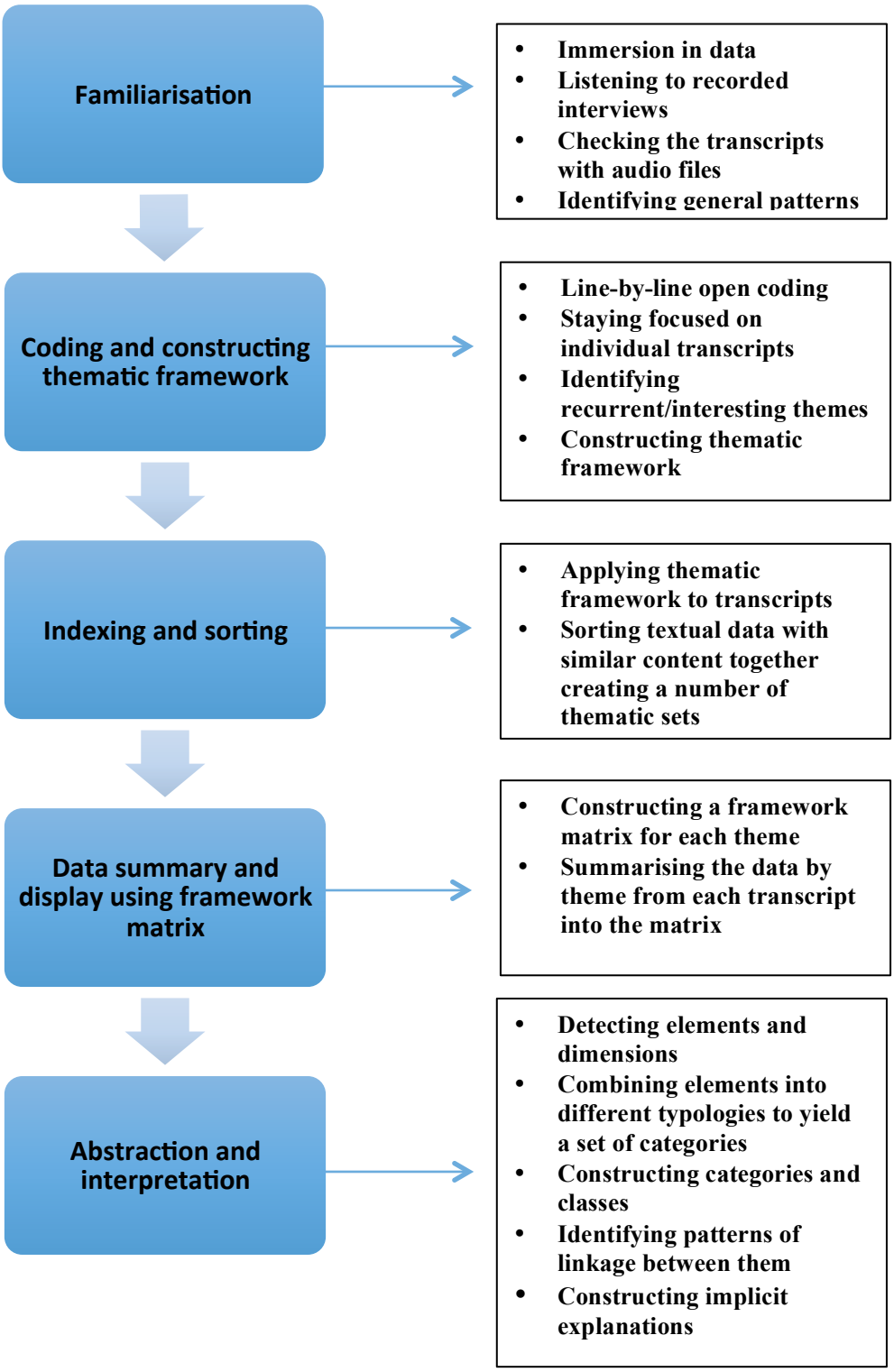


Figure 10 Framework analysis process and example of its application

5.7.1.2 Coding and constructing an initial thematic framework

After familiarisation, I performed a line-by-line initial/open coding of the transcripts using coding sheets in Word document to identify a thematic framework. Codes were applied to behaviours, incidents, values, emotions and everything that was seen relevant from as many perspectives as possible. Sometimes “in vivo” codes were used, which involved lifting a word or phrase actually used by an interviewee that explained or described a phenomenon. In addition, more detailed notes and ideas were recorded on the right margin of the open coding sheet. These notes covered important points that needed to be revisited or investigated further in the data, and which could lead to ideas for explanations, patterns and theming of the data. According to Saldana (2015), line-by-line coding can alert researcher to consider things that are not clearly expressed or does not fit well with the rest of the account, thus developing stronger analysis. Staying focused on each individual transcript at this stage of coding was important to avoid imposing prior assumptions or expectations on the data and allowing the key concepts to emerge. Although this study was not taking an entirely inductive approach, open coding ensured that important aspects of the data are not missed or overlooked (Charmaz, 2014). Analytic meetings with the research team were carried regularly during this stage to discuss coding and offer alternative viewpoints, thus ensuring that one particular perspective does not dominate. An excerpt of the initial/open coding process is presented in Appendix 10.

After coding a few transcripts, codes that label topics or issues of interest or recurrent across the data were grouped together and structured into an initial thematic framework for organising the data. Underlying themes that link particular items were identified and used to group and sort them according to different level of generality. A descriptive note for each theme and subtheme to clarify its meaning and how it should be used was written. Themes and

subthemes were also given numbers to help differentiate them. It was helpful to have an “other” under each theme in the framework to avoid ignoring data that does not fit at a certain time of the analysis process. The resulting thematic framework was not permanent and required several iterations before no additional themes emerged. The initial thematic framework developed for this study is presented in Appendix 11.

5.7.1.3 Indexing and Sorting

At this stage, the developed thematic framework was applied to the data by indexing transcripts using the existing themes and subthemes. The use of Computer Assisted Qualitative Data Analysis Software (CAQDAS) was particularly useful at this stage because it speeded up the process and ensured that data is easily retrievable. Transcripts were uploaded to NVivo 11 software and the thematic framework was used to annotate and label the data. This involved applying labels to portions and sections of the data that were judged by the researcher to be about the same thing and correspond to a particular theme. This step ensured that similarly labelled data extracts reviewed together to be further analysed. After the indexing step was completed, data was sorted so that textual data with similar content or properties were viewed together as a whole creating a number of thematic sets. This step was quick and straightforward by using NVivo software. Another advantage of using CAQDAS for sorting data is the ability to view data extracts within their context. NVivo offers a feature of highlighting data extracts and locating them within their context in the interview transcripts by just clicking on the title link (Bazeley, 2013). An example of indexing is presented in Figure 11.

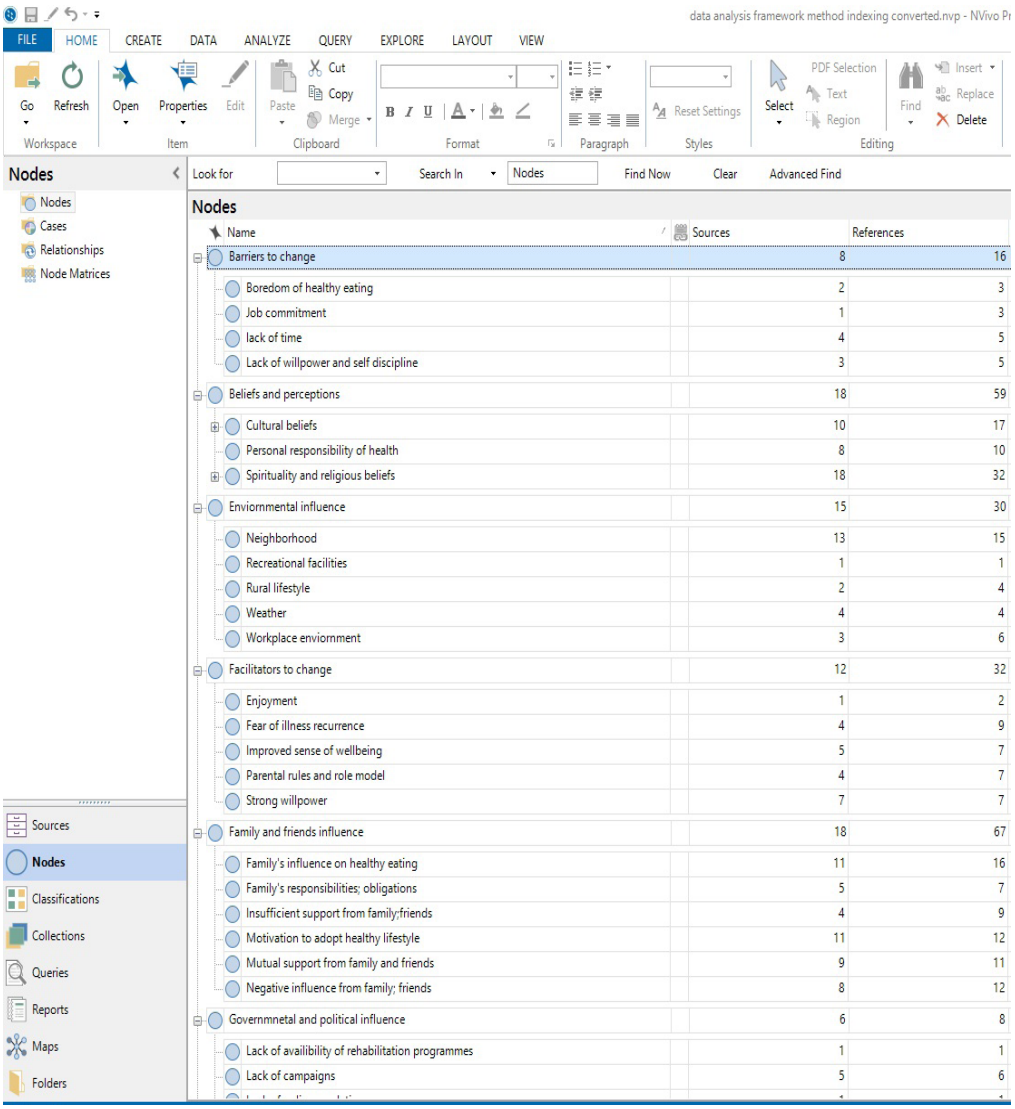


Figure 11 Sample of indexing in NVivo 11

5.7.1.4 Data summary and display using framework matrix

This step served to reduce the amount of data into a more manageable level. This was done by constructing a framework matrix for each theme and allocating a column for each subtheme. The first column was reserved for demographic characteristics of each participant. Each participant was then assigned a row in the matrix that was consistent across every matrix to enable comparisons at the individual level. Charting involved summarising the data

by theme from each transcript into the matrix, using verbatim words from the participants that corresponded to the theme. Framework matrices were generated automatically by using NVivo 11.

5.7.1.5 Abstraction and interpretation

This final stage involved the analysis of the key characteristics as laid out in the matrices through a number of different steps. It began by constructing categories and classes then identifying patterns of linkage between them. Explanations that attempt to account for identified patterns of linkage were developed at a later stage when most of the descriptive and typological work had been undertaken. To accomplish this, I revisited the aims of the study and the theoretical framework as reference points in addition to conceptual ideas generated inductively from the data.

The process of detecting elements and dimensions within raw data extracts involved trying to understand 'what is happening'. Since this was an intense conceptualisation stage of analysis, it was wise to work outside NVivo software so that several revisions can be made. Figure 12. Illustrates the first step of this process in which column A presented raw textual data relating to subtheme 'beliefs and perceptions', and column B shows a preliminary list of elements that appear in the text. In Figure 13, however, column A showed list of the elements across the subtheme and underlying dimensions are showed in column B.

Detecting Elements and Dimensions (1): Beliefs and perceptions theme

A- Data summaries for subtheme: Spirituality and religious beliefs	B- Detected elements:
KAU08: Mm I was okay, not worried about myself because I believe in god and I know that good things could come from this. Health is viewed in Islam as one of the greatest blessings that God has given to us. And prophet Muhammad outlines the teachings that show everyone how to protect his health. The prohibition of alcohol and drugs is an example. We all know how much it can cause damage to both mind and body. Islam also promote the eating of healthy food and eating in moderation " Eat and Drink, but avoid excess"	- believing good things can come from illness - health is a gift from God - Islam helps protect our health - Islam promotes healthy lifestyles
KFH09: Well, whenever I am depressed or in a bad mood I just read Quran and I feel better. I think if a person did not have a good connection with god he or she would live a miserable life. Praying and fasting have been proven to have a great health benefits on us	- reciting Quran hep change the mood - praying and fasting have health benefits
KAU14: Islamic teachings are always for our own good. Health benefits of fasting and praying are proof that Islam has a positive influence on our lifestyles. My blood sugar becomes normal when I fast. I also eat less and feel more energetic and focused.	- Islam has positive influence on health and wellbeing
KAU18: Oh [religion can influence our lifestyles] in so many ways. First is prayer. We pray five times a day. That is an exercise and helps release stress and negative energy from our bodies. Second is fasting. There is a scientific evidence about the benefits of fasting on our health. There is supplication and Quran recital too. That helps with mood swings and anger management. Islam is supplemental to every aspect of our lives	- health benefits of praying - health benefits of fasting - reciting Quran helps change the mood
KFH19: you mean like depressed or anxious. No, nothing at all. I was more than okay. I don't get to be worried about illness or disease. I am a believer, I believe in God and happily accept whatever comes from him. I am Muslim. I believe in predestination. Everything that happens in this world, good or bad, comes from God.	- accepting that illness and health comes from God - strong belief in predestination

Figure 12 First step in detecting elements and dimensions

Following on from detecting dimensions, I combined elements into different typologies to yield a set of categories. At this stage, I moved away from the language used by the participants to develop more theoretical concepts and themes influenced by the social ecological model core concepts. The process of categorising went through several iterations, trying different grouping of elements, to make sure that categorisation is comprehensive and capturing all elements of relevance to answer the research questions (Ritchie *et al.*, 2014).

Detecting Elements and Dimensions (2): Beliefs and Perceptions theme

A- Detected elements across the data set for " beliefs and perceptions"	B- Key dimensions:
- using traditional remedies to control blood pressure - using traditional drinks to prevent heart diseases - using traditional remedies for pain relief - using traditional drinks after heavy meals	- trusting traditional medicine
- Islam helps protect our health - Islam promotes healthy lifestyles - Islam has positive influence on health and wellbeing - health benefits of praying - health benefits of fasting - reciting Quran helps change the mood - religion is a facilitator to lifestyle change - health benefits of alcohol prohibition - benefits of fasting and praying are proved by scientific research - commitment to Islamic teachings promotes health	- positive effects of religion on health behaviour
- accepting that illness and health comes from God - strong belief in predestination - health is a gift from God - no control over illness onset - belief in illness predetermination helps with coping and accepting illness	- illness predetermination

Figure 13 Second step in detecting elements and dimensions

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As Ritchie et al. (2014) remark, the process of searching for explanation of patterns of linkage is rather hard to explain as it involves a mix of reading, following leads and studying pattern of associations until pieces of the puzzle fit. They further state that constructing an explanation may be explicit based on accounts given by participants or implicit based on inferences made by the researchers. To construct implicit explanation at this stage, I introduced the theoretical concepts that matched the data to help explain the challenges and opportunities participants faced to adopt healthy lifestyles. Applying the theoretical framework at this late stage of the analytic process ensured that detailed richness in the data is preserved and prevented from forcing the findings to fit into preconceived ideas (Ritchie *et al.*, 2014; Gale *et al.*, 2013). Using relevant theoretical ideas and concepts taken from existing literature to extend the interpretation of the findings helped in developing coherent themes, which offered thorough explanation of the data. Data analysis

process ended when emergent themes and subthemes were written and illustrated by quotations from the interview data.

5.7.2 Use of Computer Assisted Qualitative Data Analysis Software

QSR NVivo version 11 was used to manage and sort the large volume of data collected throughout the study. It is a computer software package that enable researchers to sort their data files in one place and develop an analytic structure to assist with analysis (Bazeley, 2013). The functions of coding facility, memos and annotations as well as data summary and display through framework matrix were utilised. Nvivo was very useful in indexing and sorting text into coding categories once the initial coding and thematic framework had been developed on Word documents. Also, the memo writing function that NVivo offers stores the notes alongside the categories or subthemes and allow links to be made between memos to help with conceptual development.

In comparison with manual methods, the use of CAQDAS strengthens research design by improving analytical rigour and making quality easier to demonstrate (Flick, 2014). CAQDAS can be very helpful in improving transparency of the research by providing electronic audit trails of the process of analysis (Bazeley, 2013). NVivo also support pdf files and graphics that can be integrated into the analysis. Such feature facilitated visualising the findings using families and relationships between codes. Thus, the use of software as an analytic support to aid the process of analysis provided several benefits in improving rigour and transparency of the findings.

5.8 Quality in qualitative research

A common criticism that has been levelled at qualitative research is that it lacks the scientific rigour and credibility associated with quantitative methods, given the highly interpretive nature of inquiry (Crotty, 2015). It is similarly debatable that the application of quantitative conceptualisations of validity and reliability is inappropriate in evaluating qualitative research, as the purpose and focus of the approaches are not directly comparable (Seale *et al.*, 2004; Creswell, 2013; Silverman, 2013). In response, various attempts have been made to develop alternative rigorous criteria for assessing qualitative research (Lincoln and Guba, 1985; Popay, Rogers and Williams, 1998; Corbin and Strauss, 2008). Horsburgh (2003) argues that whilst the precise criteria for evaluating research differ according to the questions the study has posed and the adopted approach to address it, the fundamental principles of assessing the research are the same. In essence, a number of the fundamental principles of evaluating qualitative research identified by Popay et al. (1998) were applied in the conduct of this research to enhance the rigour of the findings.

5.8.1 Reflexivity

The process of reflexivity is one of the pillars of critical qualitative research that allows the researcher to consider their own role in the research proceedings, it refers to the continuous process of reflecting on how one's own position, preconceptions, behaviour and values impact on the conduct of research and its outcomes (Finlay, 2002). Silverman (2013) claims that reflecting on the process of my own research and trying to understand how my own beliefs and values may influence the findings and adds credibility to the research, hence should be a part of any method of qualitative inquiry. Central to the process of reflexivity is the recognition that I, the researcher,

am a part of the social world under study and that neutrality and detachment during data collection, analysis and interpretation is impossible (Jootun, McGhee and Marland, 2009). My background, prior knowledge and experience, as well as my sociocultural situation influenced the constructions of the stories told in the research interview by participants. It has equally influenced the meaning given to these stories and ultimately the way in which the analysis and interpretation proceeded. The way I presented myself, as a nurse and a researcher, coupled with how I was perceived by the participants all influenced the account created in each interview. For instance, I may have been perceived by the participants, particularly male participants, as a young female researcher who works for both the hospital and the university. I was explicit in telling people about my background in nursing and stressed that I was not a doctor. All these factors may have had an influence on the flow of the interview and could have changed the way the participants chose to tell their stories. People may have wanted to convey a particular positive image of who they were and how they were coping with their illness. For example, one of the participants told me that I should not be doing this job at my young age. This example give an insight into how I was viewed by those I was interviewing and reflexive practice, including discussions with my supervisors, helped me to see this.

To address this, I engaged in a reflexive practice by reflecting on my role in the research process and recording my thoughts and impressions after each interview in an interview diary. Examples of the reflections I recorded are instance where I felt I had a particular influence on something that was said or when participants where hesitant to disclose personal details because of my position or sociocultural background. Being a young female, I felt I have been given a particular account especially with male participants because of the perceived social norms and expectations in Saudi Arabia. Therefore, frequent

de-briefing and discussions with the research team helped to objectify my thoughts.

As a Saudi nurse, I am aware that secondary and primary preventive practices such as a healthy diet, exercise, and tobacco reduction are practiced far less in Saudi than in other developed countries. Moreover, there are no rehabilitation services in the Western region of Saudi Arabia (where the interviews were conducted) and patients are discharged with prescribed drugs and dietary changes for secondary prevention, but most are unable to change their lifestyle and, as a result, are readmitted after a second attack (Alasiry, 2018). I was deeply immersed in the data (e.g., transcribing, reading, and rereading the transcripts; conducting an inductive analysis) and maintained transparency while I subjectively analysed the data. I used inductive methods of investigation by simultaneously collecting and analysing the data and maintaining the field notes and a reflective journal. I wrote down my thoughts as they came to mind, and I was able make connection to my previous experience. I often asked myself what other questions would help me to make deeper interpretations, how I could build trust with the participants, and what would help me to maintain adequate sensitivity and flexibility in the data collection process. The process of maintaining reflexive notes stimulated my thoughts, and I became more conscious of the need to acknowledge my biases, feelings, and thoughts during the research process.

As Finlay (2002) suggested that any qualitative finding is co-constituted by the participants and researcher, acknowledging that the study findings were the product of my interpretation, as a researcher, was exploited as an advantage. While I was striving to understand the participants' experiences from their own perspective, my connection to their social world produced theoretical understanding and sensitivity. I was able to construct a meaning that would

not be apparent to an outsider. Hence, acknowledging the subjective aspect of the research process by providing reflexive account enhanced the rigour of the study (Dowling, 2006).

5.8.2 Subjective meaning

Illuminating the subjective meaning of participants has been highlighted by Popay et al. (1998) as a criterion for evaluation of qualitative health research. Interpretation of subjective meaning within the study entails that participant narratives or quotations are used as the data base upon which all subsequent analysis and interpretation are firmly grounded (Horsburgh, 2003). In this study, participants' narratives were integrated within a systematic approach to support the interpretation of data. It was crucial thought to acknowledge the social context and bring the researcher's insight and interpretation of the participants' narratives to produce comprehensible accounts of the experience. To do so, the background and demographic details of the participants as well as the settings within which participants were situated were fully described to place the data within a wider context.

5.8.3 Transparency

In order to assess the plausibility and trustworthiness of qualitative research, it is necessary for researchers to reveal to their readers the data, theory and methodology on which their conclusions rest (Silverman, 2013). Transparency is an attempt to demonstrate the credibility of the qualitative research evidence by making the essential component of his/her work visible, thereby allowing the reader to understand the decision making of the researchers and their analytical approach to data (Moravcsik, 2014). In this study, transparency was sought by providing the reader with all the necessary

justifications for choosing particular data collection and analysis procedures. I have maintained a log of all research activities including memos and research journals and documented all data collection and analysis procedures throughout the study. To ensure analytic transparency, I have provided step-by-step detailed description of the interpretive process as well as an account of the basis on which the research reached particular conclusions. Thus, the implementation of the above principles not only advanced the credibility of the findings, but also presented valid alternative to the principles of eliminating bias and objectivity in the justification of quantitative evidence (Popay, Rogers and Williams, 1998).

5.9 Conclusion

This chapter have presented a detailed account of the research process and provided a rationale for each choice. The next chapter (Chapter 6) presents and synthesise the findings from the interviews and portray the participants' experiences of factors that facilitated or hindered their ability to handle lifestyle changes that are conceptualised under six major themes.

Chapter 6 – Findings

6.1 Introduction

In depth individual interviews were conducted with thirteen male and eight female participants to assess their knowledge of healthy lifestyles and seek their views on what helps or hinders changes in their lifestyles after their diagnosis of cardiac disease. Overall, the participants were greatly concerned about their disease and wondered how could they prevent a reoccurrence or slow the progression of their condition. They described the challenges they face to make lifestyle changes because their behaviours are linked to their values, beliefs, culture and customs. The findings portray participants' experiences of the factors that facilitated or hindered their ability to handle lifestyle changes.

These factors are further conceptualised under six major themes which are: (a) sociocultural norms and expectations; (b) perceptions of illness causation and lifestyle change; (c) environmental influences; (d) health and wellbeing; (e) structural constraints to healthy lifestyle choices; (f) and personal characteristics. Each main theme comprised of a number of sub-themes, depending upon the context, can be classified as either barriers to or facilitators of lifestyle change or both, and illustrated by quotations from the interview data as shown in Figure 14. Pseudonyms are used for participants' quotations. The theoretical concepts that matched the data were applied to help explain the challenges and opportunities participants faced to adopt healthy lifestyles. Using relevant theoretical ideas and concepts taken from existing literature to extend the interpretation of the findings helped in developing coherent themes, which offered thorough understanding/interpretation of the data. A detailed interpretation of the emergent themes from the findings through the lens of the social ecological model (McLeroy *et al*., 1988) is presented in Chapter 7.

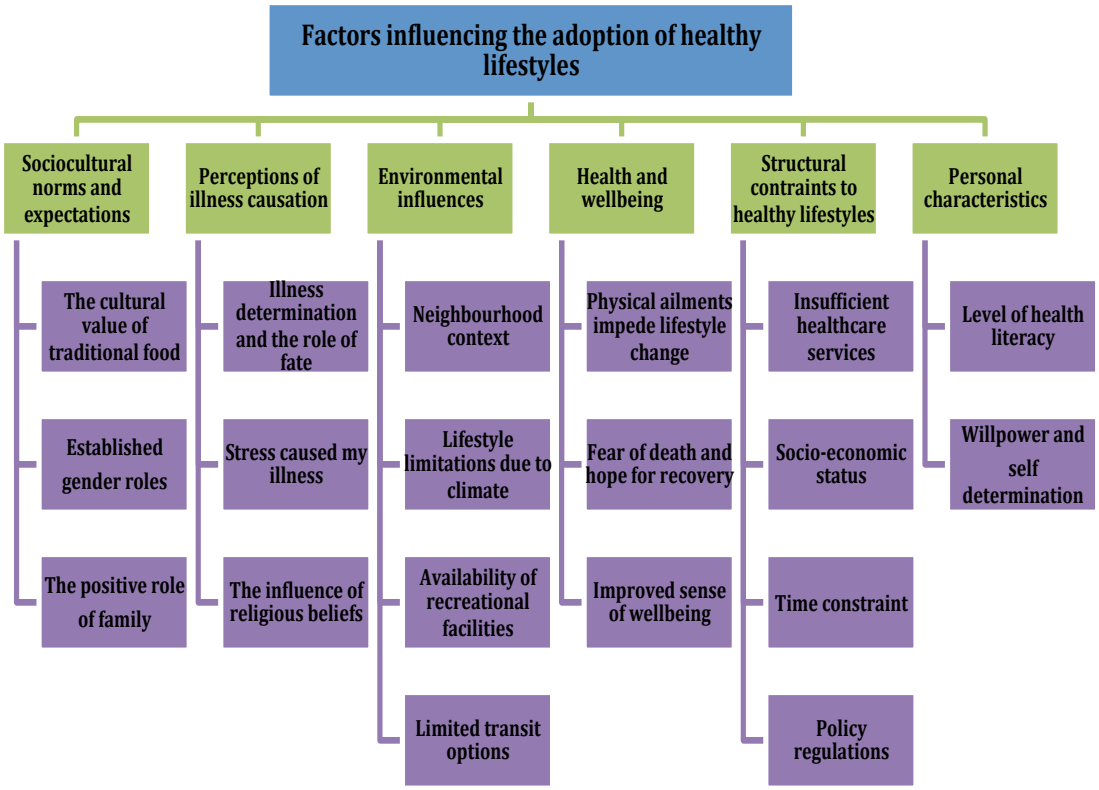

Figure 14 Major themes and subthemes

6.2 Major Themes

6.2.1 Theme 1: Sociocultural norms and expectations*:*

The analysis of participants' views on the factors that influence their lifestyles revealed multiple interacting factors, some of which are reflected in the social norms and cultural expectations attached to dietary practices, physical activity and smoking behaviour. In Saudi Arabia, cultural and religious values form the cornerstone of societal behaviour. Unique customs that Saudis have are a great source of pride and identity and holding into these customs is a high priority. Participants do not simply associate their lifestyles with their physical

health or illness; rather connect it to their social norms, attitudes and cultural beliefs. Under this theme, three primary aspects of participants' experiences with lifestyle change are identified: (a) the cultural value of traditional food; (b) established gender roles; and (c) the positive role of family. Although these aspects are interrelated, they are discussed separately to facilitate clarity.

6.2.1.1 The cultural value of traditional food

A central component of Saudi culture revolves around generosity with food offering and welcoming gesture. The offering of traditional food to others is viewed as a desirable social behaviour that reflects generosity. This fundamental role that food plays in Saudi culture affects attitudes toward dietary modification and makes it challenging to maintain a healthy diet. Mr Mohammed, a 70 year old man, explains the importance of serving traditional food to guests and how reducing the amount of fat or substituting red meat could be seen shameful and embarrassing:

> *"I love to eat lamb meat and rice. It is the only food acceptable by the society to be served to guests. Traditionally the meat is placed on the top of the rice and the fatty parts of the lamb should be placed on the top to be visible to the guests. If the lamb meat wasn't fatty we won't serve it. It is embarrassing and reflects lack of generosity. We have to value our culture. That really affects our eating habits"*
> *KAU01.*

Participants emphasised the cultural value of attending social gatherings and the central role that food plays in such events. It is a common practice for Saudis to invite others over meals to socialise and celebrate special occasions. They are also encouraged to show their generosity with food offering to meet the expectations of their family members and the wider social circle. On these occasions, participants often feel pressured to eat because

the visitor's refusal to accept food might offend the host and is widely known as unacceptable social behaviour. Mr Ali, a 64 year old man, shared his frustration with this tradition as he struggles to maintain his diet and described his challenges:

> *"Here in Saudi Arabia, culture and society are essential in shaping our eating habits. And they are poor habits, unfortunately. For example, if I want to invite people over at my house, I have to invite them over a meal, usually dinner, because we have to be generous with our guests. I have to serve them our traditional food, which is very high in fat and cholesterol, or I will be disrespectful not to do so. This makes it extremely difficult to maintain my diet" KAU07.*

Mrs Fatima, a 47- year old woman, is equally frustrated with the social acceptability of such traditions that act as a strong barrier to healthy eating:

> *"I hate when I find myself forced to eat at gatherings or weddings. You know some of the hosts insist hardly, as if it is mandatory. If we could lose this tradition, it would be much easier to maintain our diets. This does not apply to all, but the majority does it because it is just culturally acceptable behaviour." KAU14.*

Because socialisation is deeply connected with food and denying the food offered is an unaccepted social behaviour, some participants were forced to limit their social interactions and become isolated after their illness. Mr Omar, a 74 year old man, feels isolated because of his diet restrictions. He finds socialising a challenge because social gatherings force him to eat whatever is served, and refusing to eat is considered an insult to the host:

> *"I don't socialise a lot like before. There is a great possibility of eating unhealthy food at gatherings so I choose not to go. Not to mention the amount of food offered. It is always too much that makes you eat more than you need. And refusing to eat looks rude and can offend the host. I don't want to do this anymore. I have diet restrictions now that I have adopted a healthier lifestyle". KAU15.*

Despite these facts, a few participants have managed to make lifestyle changes to varying degrees and maintain a balance in their social lives. For example, a few suggested to be excused from gatherings before the food is served. Others just simply said that they are on a restricted diet because of their health condition. They found that such an excuse is very well received by hosts, as explained by Mr Ahmad, a 58 year old man:

> *"It is culturally valued to accept wedding or gathering invitations, but you are not forced to eat if you don't want to. The host does not have the right to force you to eat if you do not want to. Just give an acceptable excuse and leave. I always do that, and people are very understanding and say things like "yes sure, I wish you best of health". KFH19.*

Similarly, Mrs Amal, a 73 year old woman, perceived the social constraint as a barrier to healthy lifestyle but placed it within the individual capacity. She explained how she was able to balance between her social life and healthy lifestyle:

> *"Our culture is influential no doubt. But again the individual decides on how much to be affected. If you interact with people way too much you will eventually be influenced by their behaviours. That doesn't mean that we stay home and become unsocial. No. as said, "Following the middle path is a virtue". KAU04.*

The participants perceived social constraints as a strong barrier to healthy eating. It was evident how society influences lifestyle by shaping the accepted norms and defining social controls. Although several participants had the capacity to change their diets and adopt healthier lifestyles, the change was not significant because of their values and beliefs regarding social identity. This study shows that sociocultural influences on healthy eating among Saudis need to be taken in account when developing interventions. Intervention programmes with culturally sensitive recommendations regarding dietary patterns are required to bring changes in social attitudes and promote

healthy eating. Because sociocultural norms and values are deeply embedded within the Saudi community, changing them can be challenging. However, changes to sectors and settings can have a powerful effect on social and cultural norms over time and can align with the recommended lifestyle guidelines (Netto *et al.*, 2010).

6.2.1.2 Established gender roles

Saudi Arabia has a unique culture in which gender roles and expectations are based on a specific interpretation of Islamic sharia and are strictly enforced through legal and societal measures. Consequently, the social structure tends to be male dominated and the limitations on Saudi women's autonomy are based on cultural justifications or gender norms. Overall, woman's position in the society can be viewed lower than a man's with regards to education, marriage and access to healthcare (Al-Rasheed, 2013). Strong cultural emphasis is placed on women to attend domestic chores and prioritise family responsibilities over work, health and socialisation, especially after marriage. Although such social and cultural ideologies have changed in recent years, traditional values and practices that restrict women's mobility remain in existence, especially among the older generations.

Interview data revealed that some cultural beliefs and practices challenge women's ability to engage in physical activity in specific. Challenges included limited outdoor activities for women, negative attitudes by men and cultural expectations to remain home. Mrs Nora, a 45 year woman, explained how there was disapproval from other community members or neighbours, especially men, if women were seen walking or exercising outside alone:

> *"Our culture is an important factor to consider here. Women in specific are facing challenges to adopt healthy lifestyle. They are never left alone when they go out to walk. Especially if they are walking alone. The sharp looks and silly comments*

are hard to ignore. I do not want to generalise this on all men and social classes. However, our neighbourhood is full of these people. They are ignorant and judgmental. We are exercising our legal right to walk in walkways and utilise the resources the city provides". KAU18.

Traditional garments, *Abaya*, which women are required to wear in public in Saudi Arabia was also found to impede their opportunities to engage in physical activity. Mrs Farah, a 58 year old woman, commented on this:

"Our culture is influencing every aspect of our lives. For example, I prefer walking outdoors than going to gym but this means that I have to walk or jog wearing Abaya, which is really difficult. I could fall over and hurt myself. Not to mention cycling or any other outdoor activities. Wearing Abaya limits our options. Also it is not preferable for women to walk alone because of the men sharp looks and staring. It makes us really uncomfortable". KAU11.

Some of the female participants commented that their choices and requirements do not matter and are not respected by their husbands. An emphasis was placed upon the cultural acceptability of the controlling attitude of men toward their wives. They were forced by their husbands to stay indoors, attending to household chores, and prioritise family responsibilities over their health against their well. This was particularly evident for women who are financially dependent on men. Mrs Huda, a 38 year old, shared her frustration:

"I wish I could go to gym but my husband won't let me. He thinks that it is a waste of money!! And whom should I leave my children with. I think I would be motivated to exercise at the gym. My husband is very authoritative, everything is forbidden for me and not even open for discussion or negotiation". KAU08.

Besides barriers to physical activity, resistance to change was observed with regard to dietary modification and cooking practice. Reducing the amount of

fat or oil was not easily allowed by men even if this will cater to their wives health needs. They demanded to have the high fat foods they are accustomed to eating. Mrs Nora explained how this attitude makes changing her diet a difficult matter because the same food is cooked for the whole family:

> *"Family commitment can be a barrier to healthy eating. My husband loves kabsa [traditional rice and meat dish] and I have to cook it for him a lot. He doesn't like if I reduce fat or substitute the red meat because it will change the taste. And if I try not to eat and make a healthy meal for myself, he will be all like "why do you want to eat by yourself? Come join me, I do not like to eat alone". Well, I am following a diet and I cannot eat from the food you like. And we start arguing. He is not flexible with food choices. He loves traditional food and there must be three or four types of food on the table". KAU18.*

On the other hand, if male family members or husbands have heart disease, there is an expectation that their wives will understand and cater to their needs and prepare special food. Mr Omar affirmed this expectation:

> *"My wife cooks with olive oil instead of butter and saturated fats. She is the one responsible for food preparation. She doesn't cook fried food anymore because of my heart problem, only grilled or oven baked. She takes good care of me and makes sure I take my medications as prescribed." KAU01.*

Thus, the societal norm of male domination compounded by women's lack of autonomy and the heavy cultural and family expectations prevented some female participants from adopting healthier lifestyles. Despite their awareness of the importance of adopting healthy lifestyle and their willingness to change, they are less likely to change their behaviours because they rigidly adhere to the culturally prescribed gender roles.

6.2.1.3 The positive role of family and significant others

A major motivation for the participants to adopt healthy lifestyles is the support and advice offered by their family members. They described how strong family ties and kinship enabled them to make lifestyle changes by assisting with dietary changes, joining them as exercise companions and providing ongoing motivation and encouragement. Male participants particularly noted how their wives' support play a major role in diet selection and controlling eating habits of the entire family. Mr Ali and Mr Ahmad shared their appreciation of their wives' efforts:

> *"I think my wife influences the food choices of the whole family. She decides on the types and quantities of food cooked at home. Now that I have a heart problem she is trying to help me by reducing fat. I like to eat the food I was raised eating, our traditional food, so she won't stop making me the food I like, but at least she makes it a little bit healthier. Less oil and butter. And this can benefit the whole family not only me". KAU07.*

> *"My wife always makes sure that I stick to my dietary plan and follow the doctor's instruction. Whenever I go for follow-up I tell her what are the food restrictions that the doctors have set for me and she follows accordingly. She does not only restrict it for me only, she does it for the whole family so I do not find it hard to adhere with. For example after the surgery, my doctor told me that I have to stay away from certain fatty food such as red meat, saturated fats and clarified butter. She doesn't cook this food at home anymore and that not only makes it easier to follow, but benefit the entire family. I am so grateful for her support". KFH19.*

In addition, motivation to stick to regular exercise routine was achieved by companionship and exercising alongside family members or friends. Participants remarked the great happiness and satisfaction they acquired from having a company while exercising. Mr Omar and Mrs Fatima comment on that:

> *"They [my family] are all living healthy lifestyles too. They are all physically active. It does really help when everyone around*

you is engaging in healthy activities. It makes it so much easier. We go all together for walks when the weather gets better. They make walking and exercising more fun and enjoyable. They are the biggest help". KAU15.

"My daughters are very active. They walk on a nearby walkway every day. They always ask me to join them. I believe it is very motivating to have a company when you exercise." KAU14.

Several participants emphasised that emotional support, including expressions of empathy, trust and caring from family members and friends helped them to tackle the challenges they face in changing their behaviours. They described how words of encouragement and caring attitudes help tremendously with easing the difficulties and boredom they experience with lifestyle modification. Grown-up children, in particular, were often noted to be the most effective supporter of a healthy lifestyle. Mr Faisal described the emotional support he receives from his children:

"Sometimes I give up and lose hope, but my children never did… I sometimes get bored and say enough I want to eat like you but they do not let me. They give me words of encouragement and tremendous support. Their words motivated me to stay on track. My sons take turns to attend doctors' follow-ups with me. I never go alone. I count this as a blessing from God. I am grateful for their ongoing support". KAU17

Participants also conveyed that being alive to share time with their families was a major motivation for lifestyle change. They spoke about "having a reason for living a healthier lifestyle" as being a driving force behind engaging in healthy activities to improve their health and live longer. For some participants, this reason was to enjoy watching their children and grandchildren grow up. The following quotations illustrate this feeling:

"I have 6 daughters ... Only 3 of them are married and have children but the rest are not. I want to be there when they get married and witness their happiness. I want to see their children…. My son is the youngest. He is studying in the United Kingdom. I want to be healthy so I can attend his graduation ceremony and celebrate his achievement. How would I do that if I wasn't healthy. I have to take care of myself and preserve whatever left from my health. It is the reason why I have to adopt a healthy lifestyle."(KAU15-Omar).

"I think what motivates me the most to change my lifestyle is my fear of death. I am scared of dying too soon. I am still young and have just started my life after retirement. I have so many things that I want to do and try. My daughters are not even married. I want to enjoy my life with them and get to see my grandchildren. I am not finished yet." (KAU14- Fatima).

Despite the positive influence of family support on participants' behaviours, a few complained that overprotection from family members creates frustration, threatens their sense of autonomy and brings loss of independence. Mrs Laila's description of her children support reveals an interpretation of their caring responsibilities as controlling behaviour. She says:

"I am grateful for the support of my children, but I think they have been coddling me ever since I got sick. They have been watching what I eat and what I do very closely. They keep forcing me to retire and stay home but I hate to stay home and not do anything useful. I know they care about me, but it is my life. I should do what I want" KAU12.

Overall, family support has a direct influence on participants' behaviours and increase their willingness to change their lifestyles. With ongoing encouragement, advice and mutual support from family members, participants felt less stressed managing their care, coping with their disease and making transition to healthy lifestyles. It is important to note that although many participants were motivated by their family support, several female participants were negatively impacted by their spouses' rigid adherence to

prescribed gender roles. Interventions that aim to improve cardiac patients' adoption of healthy lifestyles need to take account of the sociocultural factors and the role of family identified in this study to promote the engagement and maintenance of healthy lifestyles among Saudis.

6.2.2 Theme 2: Perceptions of illness causation and lifestyle change

Individual's decision-making processes about the adoption of healthy lifestyles are linked to their own health beliefs, including those pertaining to causal attributions. For Saudis in particular, religion and faith play a central role in managing illness, and religious beliefs are tightly integrated with their lifestyle practices. Overall, participants were least likely to report what exactly caused their illness. They mostly attributed their heart disease to external factors such as heredity, stress and fate and rarely to their behaviours and habits. Under this theme, three main aspects of participant's perceptions toward illness causation and health beliefs are discussed: (a) illness determination and the role of fate; (b) stress caused my illness; and (c) religious beliefs motivate the uptake of healthy lifestyles.

6.2.2.1 Illness determination and the role of fate:

Perceived lack of individual control in developing cardiac disease was prevalent among the majority of participants. There was a strong belief that they had been fated to acquire their illness. They thought that there was nothing they could have done to prevent it from happening. The following quotations from Mr Omar and Mr Ahmad Clearly affirm this belief:

"Thank God is all I can say, thank God for sickness and health…I thank God for everything. I didn't feel sad or angry when I got diagnosed. We have to accept whatever comes from God… I have to live with my illness and adapt myself. What else would I do? It is all predetermined and will happen no matter what. Nothing would have prevented from happening. I know that illness happens for a reason, but as a Muslim believer I also know that nothing happens in this whole world without the permission of God". KAU15.

"I don't get to be worried about illness or disease. I am a believer, I believe in God and happily accept whatever comes from him. I am a Muslim. I believe in predestination. Everything that happens in this world, good or bad, comes from God and no power can stop it from happening". KFH19.

Besides fate and illness determination, genetics were often cited by participant as the cause of developing their heart condition. They believed that a positive family history is the only contributing factor to acquiring their illness and denied the impact of their past behaviours. Mr Fahad's quotes reflects this belief:

"I think genetics play a role in my case. My father died of a heart disease. My uncle too. It could be hereditary. I never thought of it this way, you know, that I am at risk to develop heart disease!! I always thought of it as a bad case of heartburn that won't go away, until that doctor told me to go to another hospital. Maybe it is hereditary, because I can't think of any other cause. It cannot be my lifestyle that caused my illness. I do not smoke or drink. I don't eat a lot and I am active."KAU16.

The participants also perceived their religious obligation to be thankful and grateful for their conditions because disease and suffering are from God and are part of their fate. Mrs Laila explains this:

The recitation of Quran and late night prayers helped me cope with my illness. It is all predetermined by God after all. We should never despair of his mercy. He is the most

merciful. When I think about people with more serious conditions I thank God for what I have…I think being religious helps with coping and accepting my illness. Having faith and believing that health and illness comes from God gives me strength to fight my disease. It makes me thankful and grateful for what I have…If you have faith in God, you will be thankful for whatever you have." KAU12.

A minority of participants thought that a positive family history meant cardiac disease is inevitable and out of their control. They believed that because they were genetically predisposed to cardiac disease, there was nothing they can do to avoid the onset of their illness. This was evident in an extract from Mr Nizar, a 43-year-old man who had smoked tobacco heavily from an early age and had multiple MIs. He explains how his belief that he will acquire the cardiac disease one day prevented him from complying with advice from healthcare professionals to quit smoking:

"Well, I have a family history of heart disease, so I have always known that I will have a heart problem one day. I know this is wrong but this actually why I haven't stopped smoking. They told me after my first attack that there are many risk factors for me to have heart disease including diet, physical activity, stress and smoking. I think there is no single reason for having heart disease. My uncle doesn't smoke and he suffers from heart disease, so I thought I don't need to quit smoking because I will get the disease anyway". KFH09.

Although participants attribute causality of their illness to external factors such as genetics and fate and not internal ones, this should not be confused with fatalism. Fatalism is the belief that life events are predestined and individuals are therefore powerless against fate (Morgan, Tyler and Fogel, 2008). Such belief is contrary to the teachings of Islam that encourage individuals to maintain their health. Participants' narratives suggest that although some individuals thought they had no control over the onset of their illness, they were still willing to make lifestyle changes to stop the progress of their disease and prevent further complications. They believed that making lifestyle

changes and promoting healthy living is a religious obligation to prevent further complications. This was reflected in Mrs Nora's comments:

> *"Everyone is responsible about the care of his or her own health. It is a gift from God and should not be wasted. You know a lot of chronic diseases can be prevented if you change the way you live and learn how to handle your stress. My belief that taking proper care of my health is my body's right helped me a lot to adhere to my medications and adopt a healthier lifestyle. If I neglected my health, I will get worse and might even suffer from a debilitating disease that seriously affects or interfere with my ability to carry on basic daily activities. Why would I do this to myself and my loved ones? I hate to feel dependent on others". KAU18.*

Similarly, Mr Mohammed stressed that although he believed in illness determination, he acknowledged the individual responsibility for protecting his own health in terms of lifestyle modification and compliance with healthcare providers' recommendations:

> *"I believe in illness determination, however, I do not deny my responsibility toward my health. I have to follow doctor recommendations and comply with the prescribed medications and lifestyle advice. Our health is the most valuable possession. We will be asked about it on the day of judgement." KAU01.*

6.2.2.2 Stress caused my illness

Approximately half of the participants reported stress as contributing to the development of their Cardiac disease. They described events in their lives that they thought had caused them considerable stress and tension and triggered or worsen their health conditions. Some of the participants thought that their disease had developed as a result of the stress they experienced because of a particular life incident; for example, Mr Faisal talked about the

stress brought by the sudden death of his mother. He recalled the incident bringing on feelings of extreme grief that was difficult to control:

> *I never thought I would have a heart problem. I actually had the disease because I was very depressed and sad after the sudden death of my mother. It was a life-changing event for me… I believe that the feelings of extreme remorse and grief that I had after her death caused my diabetes. And diabetes caused everything I had after, the stroke, the heart problems". KAU17.*

Other participants reported that living under stressful circumstances for prolonged period of time had a negative effect on their health. This includes work related problems, caring for young or ill family members or stressful family situations. As Mr Nizar explains:

> *"The last attack I had was because of work related problems. I was really stressed. I was actually arguing with someone at work when I started to feel chest pain and shortness of breath…I am a very tense person. I get nervous quickly and I believe that working or living under stress has caused what I have right now". KFH09.*

Stress management techniques in terms of reducing workload or making effort to reduce worrying thoughts were reported by some participants as preventative measures. Mrs Fatima commented on this:

> *"I think stress management is a priority to maintain our health. Especially for women. We live under tremendous amount of stress because of our family responsibilities. We have to learn how to control our anger issues and reduce worrying thoughts to minimise its impact on our health and wellbeing". KAU14.*

6.2.2.3 Religious beliefs motivate the uptake of healthy lifestyles

Overall, participants' spiritual beliefs supported them in coming to term with their changed health status. They also perceived their religion as supporting

positive lifestyle choices rather than getting in the way of such choices. Participants were citing verses from the Qur'an on the importance of maintaining healthy lifestyles and looking after their bodies and taking responsibility of one's health. This is reflected in the following quotes from Mrs Nora and Mr Faisal:

> *"Religion can influence our lifestyles in so many ways. First is prayer. We pray five times a day. That is an exercise and helps release stress and negative energy from our bodies. Second is fasting. There is a scientific evidence about the benefits of fasting on our health. There is supplication and Quran recital too. That helps with mood swings and anger management. Islam is supplemental to every aspect of our lives" KAU18.*

> *"Following Islamic teachings encourages us to adopt and maintain a healthier lifestyle. Moderate eating, alcohol and smoking prohibition and fasting are few of so many Islamic rules that help in living healthier lives. I think Islam's positive influence on lifestyle is an established fact" KAU17.*

Participants cited the teachings of the Prophet Mohammed to support a more active and moderate eating habits. They emphasised the resonance between Islamic teachings and healthy lifestyle messages such as portion control and looking after one's body. Prayers, a ritual recitation offered in sequential different standing and sitting positions that Muslims are required to perform five times daily, were widely referred to as a form of exercise. This is illustrated in Mr Mohammed comments:

> *"Commitment to Islamic rules help in maintaining healthy lifestyle. For example, Prophet Mohammed peace be upon him said before 1400 years that no man fills a container worse than his stomach, and if he has to, then he should keep one-third for food, one-third for drink and one-third for his breathing. If we follow this, no one will suffer from obesity. Also praying is considered an exercise and we pray five times a day. It helps circulate the blood and improves the mood. I think religion has a positive impact on our lives if we are committed to its rules" KAU01.*

Participants were careful to distinguish between Saudi cultural norms about eating and physical activity (generosity in food offering and lack of walking culture) from religious norms which recommend eating in moderation and remaining active, as illustrated in Mr Abdullah's, a 53 year old man, comments:

> *" Islamic teachings and rules that encourage adoption of healthy lifestyles are clear and well known. Looking after our own health and eating in moderation are central part of a Muslim life. Sadly, few people are committed to these teachings and applying it to their daily life routines. I believe our adherence to cultural traditions and norms is the reason behind this. We should not confuse between our established cultural norms which we invented and our religious norms" KAU03.*

On the whole, unique qualities of Saudis religious belief system and perceptions of illness causation influence their attitudes towards lifestyle behaviours. Perceptions regarding self-control over disease are important determinants in behaviour change. Individuals who do not believe their lifestyles contributed to acquiring their illnesses are less likely to engage in healthy lifestyles. Therefore, to strategise behaviour change that promotes health, it is important to identify patients' perceptions regarding illness causations and individual responsibility as well as understand the factors that influence their willingness and capacity to change.

6.2.3 Theme 3: Environmental influences on lifestyle change

The importance of the environment as a structural condition that shapes individuals' behaviours has been long recognised in the literature. In fact,

environment can influence individuals' decisions to adopt and maintain healthy lifestyles by promoting or discouraging physical activity through factors such as, neighbourhood context, climate conditions, accessibility of recreation facilities, and transit options. Reported environmental factors in the present study were consistently related to physical activity and barely to diet or smoking.

6.2.3.1 The influence of neighbourhood context

Safe and easy access to walkways and facilities in the immediate neighbourhood of the participants was perceived as a major determinant for the feasibility of engaging and maintaining physical activity. Concerns with safety were raised by several participants particularly with the lack of pedestrians' cross signs and missed sidewalks. Participants who lived in old neighbourhoods were afraid to walk on roads without sidewalk or traffic lights because of uneven pavement, poor lighting at night and fast moving traffic. Mr Fahad shared his concerns:

> *"I live in an old poor neighbourhood. It is mostly composed of old houses and there are some buildings too. It is underdeveloped. No one can go out there and walk safely. I find it very dangerous to walk with my wife and children because there are no sidewalks or traffic lights. That is why I walk every morning after I drop my daughter at school. I drive my car for 5 or 6 minutes and park it then walk on the sidewalk. Living in this neighbourhood makes it harder for me to adhere to my daily walking routine I believe. I don't exercise during weekends or school holidays because there is no motive" KAU16.*

Similarly, Mr Abdullah explained how characteristics of neighbourhood could increase perceived danger on the street and negatively affect integrating physical activity within everyday routine. He stated:

"Honestly the environment does not help [with lifestyle change]. It does not help us to have a workout schedule or include walking in our everyday routine. For example, the residential areas are not suitable for walking, we don't have facilitated walkways and there are no signs for pedestrians to cross the streets." KAU03.

Few participants recognised the neighbourhood social environment as important to physical activity as the physical environment. They noted the positive impact of neighbourhood social cohesion on physical activity, particularly for women, as illustrated in Mrs Nora's quote:

"I live in an old underdeveloped neighbourhood that has very limited services, or no services at all (laughing). Most of our neighbours are low-income families and not well educated. When I compare it to other neighbourhoods in North or West Jeddah, I certainly see the difference. Pedestrian cross signs are everywhere. There are high quality walkways that are clean and wide to accommodate large numbers. I came across a covered walkway few days ago. It is really great. These things are ideal for walking I guess. Living in such a neighbourhood encourages you to walk every day. Social characteristics of the neighbourhood can influence your lifestyle too. I mean when you live in a developed neighbourhood you mostly interact with well-educated people who won't bother or trouble a women walking alone. That is why we see women more than men utilising the resources their neighbourhood offers nowadays." KAU18.

Conversely, participants who lived in newly developed or renovated neighbourhoods were pleased with the available facilities and accessible services. The presence of sidewalks in good conditions, wide spacious walkways and proper lighting were associated with increased level of physical activity and walking to mosques and nearby destinations.

"I am lucky that I live in a facilitated neighbourhood. We have a major walkway within a walking distant from my house. You see people all the time walking and that motivates me to go

and walk. My neighbours are educated and very respectful. No one bothers anyone walking, even if women are walking alone." (KAU05- Reda, 64 male).

"I live in a newly developed residential district in East Jeddah. I find it very organised and has a walkway close by. There are no open spaces or parks for family but we can always go to public parks for a picnic or something. There are plenty of them here in Jeddah. Living is such a neighbourhood encourages you to walk more often." (KFH19 – Ahmad).

6.2.3.2 Lifestyle limitations due to climate

Jeddah has hot desert weather; temperatures can spike up to 40 degrees in summer months. Spring and autumn are relatively warm and winter is pleasant with temperatures between 20 to 30, cooling at night to 15 degrees. The impact of living in such harsh climate on physical activity has been cited by several participants. They found it very difficult to engage in outdoor activities, even to go out for a walk especially during hot summer months. Mr Abdullah said:

"The weather has a great influence on us here in this country, it demotivates us to go out for a walk or become active persons"KAU03.

Nonetheless, participants suggested other options for indoor activities to remain active when the weather becomes very hot. Mrs Farah stated:

"Sometime the weather becomes an issue here in Jeddah. It gets really hot in the summer. So, last year I got a treadmill and spinning machine at home". KAU11.

6.2.3.3 Accessibility and availability of recreational facilities

A great environmental factor on the willingness of participants to engage and maintain physical activity routine is the accessibility and availability of recreational facilities. Recently, various facilities have been established throughout the Kingdom ranging from major sports complexes to neighbourhood walkways and playgrounds in large urban areas. Several participants acknowledged the efforts of Saudi government in creating various sports clubs and fully serviced walkways throughout all the regions to meet the needs of both Saudi men and women. They noted however, the unequal distribution of these facilities between old and new neighbourhoods and the consequent constraints on their access by low-income individuals:

> *"Well, now we have few walkways in Jeddah and that is a really good thing. The development of such facilities shows that people want to change their habits and become more active." (KAU07- Ali).*

> *" You now see shared public gardens where children can play. Fully facilitated walkways that are nearby. These all motivate people to go outside and exercise. By the way, there is a very new walkway that I discovered accidently two weeks ago because of the road conversions on my way back home from work. I went there last week with my wife and children and was really amazed. What I really liked are the details. In the walkway you find the snake and ladder game for children as well as hopscotch. It is really great". (KAU03 – Abdullah).*

6.2.3.4 Limited transit options

Active travel, either walking or cycling offers effective opportunities to increase the level of physical activity. However, for Saudis, this option is almost absent due to dominance of automobile as a form of travel. Cities physical infrastructure and layout cause cars to be favoured over alternate forms of

transportation. Several participants perceived the lack of walking culture as an environmental barrier to physical activity. Mr Nizar shared his views:

> *"Physical activity is not incorporated within our everyday routine. We never go to work walking. It is not part of our culture. Automobile is the predominant form of transportation for work and any other travel purposes. The structure of the city does not help either. It is true we now have some walkways to motivate people to be more active but how many people actually benefit from it? It isn't as beneficial as walking to work for example."KFH09.*

Findings suggest that inadequate neighbourhood safety and harsh weather conditions can likely limit outdoor activities and have repeatedly been correlated with low physical activity levels among participants. It also highlight that modifying the built environment has been identified as one way to influence levels of physical activity, for example by increasing the suitability of an area for walking and modifying the nature and layout of the street network.

6.2.4 Theme 4: Health, wellbeing and quality of life:

This theme covers more practical impact of heart disease on life as participants adjusted to their illness. Issues pertaining to the influence of physical and cognitive symptoms on participants' quality of life and willingness to adopt healthy lifestyles are discussed.

6.2.4.1 Physical ailments impede lifestyle change

Participants voiced their concerns about limitations on their physical activity routines imposed by physical problems and symptoms. These included existing comorbidities such as arthritis, back and knee problems, and

symptoms associated with their illness such as shortness of breath, weakness and fatigue. Musculoskeletal physical problems, in particular, posed the greatest threat to initiating and maintaining an exercise programme. This was evident in an extract from Mr Faisal, a 59 year old male, who had multiple MIs and a stroke and suffers from arthritis in both knees. He shared with sorrow his struggle to engage in physical activities:

> *"It took me years to fully regain my limb movements after the stroke. However, now that I have recovered, I have stiff achy knees. My left knee is completely stiff, and needs knee replacement surgery. My right knee has 6 months, or a year maximum, and then I will need a replacement surgery too. Yet, surgery is off the limits because of my heart problem and medical history…[pause] my knees problem makes it not only hard, but also impossible to be active. I mean even if I am motivated and self-determined to adopt a healthy lifestyle, my knees discourage me and limit my ability to engage in any physical activities". KAU17.*

Living with cardiac illness, many participants suffered from shortness of breath, fatigue and exhaustion. Mr Reda, explains how exhaustion was debilitating for him:

> *I am tired all the times. I want to exercise but I am too tired to carry on any strenuous activity. I walk now instead, either alone or with my neighbours or friends. It became a part of my everyday routine. I think that my illness and the constant feeling of exhaustion makes it harder for me to carry on any activity."KAU05.*

For some participants, physical symptoms of extreme fatigue and exhaustion were not only problematic with initiating exercise routine but rather with carrying on activities of daily livings. Mrs. Mona, a 62 female, admits:

> *"I used to be very active. I worked as a teacher for 17 years, yet I took care of my husband. I cook, clean, and do everything by myself. I have never had a housemaid or helper. However, after I became unwell, I cannot even climb the stairs. I feel tired and exhausted all the time even with the*

simplest activity… I cannot do any of that anymore. I get tired quick and pant and sweat as if I have been running a marathon."KAU06.

Mrs. Amal shared a very similar experience:

"I used to be very active. Not exercise, but active at home. I loved to do everything myself. Things like cooking, housekeeping and watering the plants. My house has always been open for everybody. My children, grandchildren, friends and neighbours. I have always been a great host. I prepare everything at home. I cook, serve, and do everything by myself. I have a housemaid to help me, but I still loved to do everything by myself. Now everything changed. I am extremely exhausted. I have palpitations all the times. Even from the lightest activity. I cannot cook anymore. I cannot even climb up the stairs because of my stiff knees. My husband hired another housemaid to help with the housework….I think fatigue and exhaustion make it harder for me to be physically active. I am feeling better with the medications but still not like before."KAU04.

Diversity in physical abilities and maintenance of exercise routine existed within the participants due to variation in disease progression, the extent of physical symptoms and the presence of comorbidities. Findings shed a light on the effect physical symptoms and comorbid conditions have on limitations in activity and hence on one's ability to engage in healthy lifestyles, in particular physical activity.

6.2.4.2 Fear of death and hope for recovery facilitates lifestyle change

Living with cardiac disease had been described as a traumatic and frightening experience that had a considerable impact on all of the participants without exception. Fear of having another attack, particularly that it might be worse or even fatal, and the desire to get back to normal life had been a dominant

theme that emerged across interviews. Although this sense of mortality and vulnerability to future attacks frightened the participants, it has actually facilitated their adherence to healthy lifestyles. Mrs Fatima reflected on the impact of this sense of fear on her lifestyle:

> *"I think what motivates me the most is my fear of illness. I am scared of getting worse. I have seen how my fathers' illness changed his whole life. He suffered a lot before dying. I don't want this to happen to me. I want to maintain my health as much as I can to prevent or stop the progression of my disease. The earlier you manage your illness the better are the outcomes. I think this feeling motivates me to change my lifestyle to a healthier one". KAU14.*

Similarly, Mr Ayman, a 53 year old male, described his fear of a second attack as a "wake-up call" to change his behaviour and adopt a healthier lifestyle:

> *"I am so scared of my illness.. The attack I had changed my life. I wish no one would go through that. Heart attack is a disaster, calamity. Who thinks of it as a mild disease is wrong. It is life threatening. I didn't think I would survive it. I didn't think I'll ever go home. It was like a wake-up call for me. Like I've been told it is time to quit smoking and change your lifestyle. It is a chance I have been given to change my lifestyle and preserve whatever health I have left. I think my illness made me afraid. And being afraid has been my motive to change my lifestyle."KAU13.*

Few participants have also been motivated to change their diet out of fear of being a burden on others or being left alone because of their disease. Mr Fahad shared his concerns:

> *"The scary feeling that my disease will kill me if I don't change my lifestyle and adhere to my prescribed medication…The fear that my disease might progress and become a burden on everybody around me. That feeling was and still my biggest motivation."KAU16.*

Participants shared feelings of regret over past behaviours due to fear of death and sense of vulnerability. The following quotations illustrate this feeling:

> *"I started changing my lifestyle very late. It is a big mistake. I should have started earlier, when I was 25 or 30 years old. I could have prevented any of this to happen. I strongly advice everyone to adopt a healthy lifestyle at a young age to prevent the development of chronic diseases. Especially if they are genetically predisposed to diabetes or hypertension or heart disease." (KAU11- Farah).*

> *"Let me tell you something that I have learned throughout my illness, you never think of your behaviour as a bad behaviour until it actually affects you. Now, I regret lots of things. I regret that I haven't stopped smoking earlier. I regret that I haven't taken enough care of my health. I didn't see that coming. I have been wasting my health for so long and look where I am now. I have to preserve whatever left of my health to the future." (KAU01- Mohammed).*

Whilst fear of disease progression, having a recurrence, disability or death were often reported by participants as an initial motivation to make lifestyle change, reduction in fear led to reduced motivation to make lifestyle change, with subsequent reversion to old lifestyle habits. Mr Omar's quote illustrates how his fear of illness initially motivated him to quit smoking, but as the time passed he went back to his old habits:

> *"I quit smoking because I was scared of my illness, not because I wanted to. I used to smoke for so long. It is a habit. When I was not scared of my illness anymore I went back to what I am used too. It wasn't the right thing to do because it affected me badly and I had another heart attack" KAU15.*

The perceived sense of mortality by some participants caused renewed feeling of appreciating life and aspiring to normality. Embracing the future with hope and resuming normality was perceived by many as a motivating factor to

sustain lifestyle changes. Participants also acknowledged the importance of a good quality of life, recognising that they were getting older and, thus, wanted to make sure they stayed healthy enough to undertake essential daily activities as well as continue doing other things that they enjoyed. Mr Ali and Mrs Mona's responses affirmed this:

> *"Loving my life is what motivates me to adopt healthier habits and change my lifestyle. I want to enjoy my life as much as I can. I like to enjoy every moment of my life to the maximum. I always make myself busy by either reading or exercising. I don't have place for depression or sorrow. I like to be a happy person and becoming ill didn't change this at all. I decided to adapt my life with my illness."KAU07.*

> *"My desire to live a normal life encourages me to maintain my lifestyle. I like to enjoy every moment of my life and not to overthink or worry about my illness and health status. This positive attitude I have helps me a lot to stay on track." KAU06.*

On the whole, participants were concerned about their illnesses. They were frightened of having a second attack or being re-hospitalised. Although fear has dominated their emotions about changing their behaviour, the hope for a better future and improved situation coupled with their desire to maintain the quality of life encouraged them to sustain the changes they have made to their lifestyles.

6.2.4.3 Health benefits and improved sense of wellbeing

Participants who have been successful in changing their behaviours following their cardiac events described motivation resulting from experiencing the effects of adopting healthy lifestyles. Improved mood status and higher energy levels were the most commonly cited benefits of regular exercise routine.

Whereas feeling light, less bloated and loosing weight were associated with a balanced healthy diet:

> *Mrs Huda: I felt how adopting a healthy lifestyle changed my life. I couldn't climb up the stairs or do housekeeping work. I was very exhausted. But now that I am exercising regularly I feel more energetic than before" (KAU08).*

> *Mr Reda: when a person adopts a healthy lifestyle, he or she starts to feel the difference. You become more active and energetic. Maybe less bloating and heartburn after meals. I think this feeling of wellbeing and satisfaction helps and motivates me to keep doing what I am doing" (KAU05).*

Perceptions of body image and physical appearance were also reported by participants as influencing their decision to adopt healthy lifestyles. They believed that associating physical activity with weight loss or body shape goals facilitated the adherence to exercise routine. However, participant with average body weight lacked the motive to exercise because they didn't have the desire to lose weight. Mr Fahad reflected on this:

> *"I knew about the benefits of walking for health and wellbeing, but I didn't have the motive. I have always been slim. People often link walking and exercise with losing weight. I used to weight 60 kg before becoming ill. I now weight 54 kg. I didn't need to lose weight so I didn't exercise. I didn't have the motive. It was not a priority for me" KAU16.*

Enjoyment of the activity or exercise routine was perceived by several participants as a powerful motivator to maintain their behaviours. Mr Ali comments:

> *"I hate to live a sedentary life. I always encourage everyone around me to be active. Especially after I retired. I became bored and had a plenty of free time. So I decided to buy a beach house. There are plenty of activities that can be done there... I alternate between activities so I don't get bored. It is so much fun during summer days in particular. My passion for exercise and enjoyment helps a lot. I never get bored. I would*

imagine being physically active is really hard on people who lack interest in exercising." KAU07.

In brief, findings revealed that a high value placed on health, improved sense of wellbeing and enjoyment was positively associated with lifestyle behaviour change.

6.2.5 Theme 5: Structural constraints to healthy lifestyle choices:

Many participants cited structural constraints to engage in healthy lifestyles including insufficient healthcare services, socio-economical status, lack of time and policy regulations.

6.2.5.1 Insufficient healthcare services

Participants recognised that insufficient support from healthcare professionals adversely impacted the effectiveness of their lifestyle modification. They spoke at great length about the importance of having good patient and healthcare provider relationships to support their efforts to manage their illnesses. Support included the components of good communication, lifestyle advice, accessibility and active partnership with patients.

Lack of communication was commonly cited by participants as a serious challenge in their relationships with physicians. Many participants felt physicians do not always talk to them in a way they can understand and had difficulty processing the given information. They complained of rushed consultations and lack of attention and empathy from physicians' side, leaving

them with unanswered questions and the feeling that their concerns are not important. Mrs. Nora reflected on her experience with provider's support:

> *"I will be very honest with you. I am not very pleased with the patient doctor relationship here. I don't mean this hospital in specific, but I am talking in general. I have been treated for years at different hospital. It is very rare to find a doctor who gives you all the attention and advice, be supportive and non judgmental. These qualities are important. It might not be as important as his experience and qualification, but it still counts. I remember once I had an appointment with a world-class surgeon at his private clinic. I paid a huge sum and waited for so long, and when I entered he frowned at me the whole time and rushed my consultation, as he doesn't care. He should have given me all the time and attention and pretended to be kind and nice no matter what was bothering him. This is my right as a patient". KAU18.*

Similarly, physicians' accessibility and time spent with patients appeared to be major factors in patients' perceptions of healthcare professional support as illustrated in Mrs Farah's quote:

> *"Another thing is the time the patients spend with the doctors during their visit. It is really important for us to spend enough time and not be rushed. People wait for weeks and sometimes months for their appointments. Imagine the disappointment when the doctor looks nervous or busy and doesn't give you the full attention. This really matters. Now this Dr M. is just wonderful. He was welcoming with a big smile like I am his only patient. He gave me enough time to ask and answered all of my questions in details. Sadly, you don't see this all the time. Other doctors, without mentioning names, make us feel like we are taking from their precious time and all he cares about is to get to the next and the next and so on. This is my health you are dealing with. The most valuable thing I have in my life. You should give me all the time I need and make me feel that you value my health as much as I do." KAU11.*

The impact of poor communication and lack of support between patients and healthcare professionals was most keenly observed when participants talked

about lifestyle advice. They noted that physicians were reluctant to discuss lifestyle changes during consultations and did not take enough time to communicate the instructions for dietary modification and level of physical activity. They complained that the information was brief and limited to the time of diagnosis only with no follow-up care. The lifestyle advice also appeared to be standardised rather than individualised. The following quotations illustrate this challenge:

> *"After this illness, my physician adviced me to limit fat and salt intake in my diet. So now, I do not eat fried food or red meat that often… however, the advice was just about my diet. No one gave me clear instructions about my lifestyle after the heart attack or the surgery." (KAU12- Laila).*

> *"I was instructed to adopt a healthier lifestyle, no smoking, healthy diet and physical activity. However, the cardiologist gave me all the instructions casually and nothing was written. Maybe if I asked I would get, but this is still wrong. There should be a systemised follow-up routine for patients with chronic conditions. Like for instance routine investigations, referrals to nutritionist or physiotherapists." (KAU07- Ali).*

> *"I was instructed to cut fats from my diet because I am at a great risk to develop a second heart attack if I am not careful. You know scary doctor talk. He told me that walking is beneficial for my heart health and my blood sugar. He adviced me to stay away from oily and fried food. To be honest that was at the beginning. He doesn't mention anything now." (KAU16- Fahad).*

Several participants expressed frustration and anger at the lack of coordination of care between healthcare providers. They complained of unmet information needs due to lack of referral to nutritionists or physiotherapists to provide explicit and details information necessary to change their behaviours. Mr Ali talked about this problem:

"Medical services here are good but not great. And they are good as long as you are hospitalised. But once you are discharged, they don't follow-up with you or track your progress or provide support. I've never been referred to a nutritionist for example." KAU07.

The findings suggest that participants lack healthcare professionals' support and have difficulty processing health information and needed individualised information to help them understand their own risk and the necessary action to take to successfully change their behaviours. It also highlights the importance of coordinating care between healthcare professionals to provide the needed information and support for patients during their lifestyle-change attempts.

6.2.5.2 Socio-economic status

On the whole, financial concerns were not a high priority for participants compared with emotional and cultural concerns. However, some participants did have financial issues, particularly those who were retired, were self-employed and those who had young families.

Several participants perceived financial issues as a powerful barrier to healthy eating and adherence to physical activity routine. The rising cost of healthy food options was cited as a challenge to adopt a heart healthy diet among limited and low-income individuals.

I think the financial status has a great influence on our eating habits and food choices, especially nowadays. Most of the healthy and organic food available in the market is imported and expensive. If you will pay 5 Riyal for a bottle of Juice, you will have to pay 20 Riyal for the organic one, for instance….the cost of healthy food can be an obstacle to

healthy eating for individuals living on low income". (KAU11-Farah).

The cost of access to health facilities and gym membership was also identified as a barrier to physical activity. This is evident in the following extracts:

> *"I find living on a limited or low income is a barrier to maintain healthy lifestyles. People may not be able to afford gym membership if the weather does not permit walking outdoors. For myself, I sometimes find that special food preparation is costly. Maybe these things are minor for wealthy people, yet it could be a big deal for others." (KAU05 – Reda).*

> *"It [financial status] is very influential in fact. Poor people may not have access to recreational facilities for example. Food choices might be limited for them too this can affect the type of food they consume". (KAU07 – Ali).*

Due to financial limitations, participants with low income were forced to set priorities for spending their money. Although they were wiling to change their lifestyles, their financial limitations made the adoption of healthy lifestyle secondary. Mrs Nora admitted embarrassingly:

> *"If a person has a low income, he or she will have to set priorities in their lives because they cannot afford everything. What I mean is that for a wealthy person, buying healthy food from grocery store and having a gym membership can be a priority and worth spending money. But for a poor person who struggles with house rent and bills, these things come last. Money is very influential. It is all about how we set our priorities in life". KAU18.*

Interestingly, several participants observed that wealth might have created negative influences on individual's health, such as constant availability of food and decreased physical activity. These negative effects are unique and

specific to Saudi's economical context. Mr Omar, a former employee at the royal court, commented on this:

> *"From my experience of working at the royal court I realised that wealth can negatively influence our lifestyles. The luxurious life we live here at this country is a problem. People are now used on being served. You see two or more servants in each house, myself included. Not to mention drivers, keepers, and gardeners. We prefer to live luxurious and inactive life. This can affect our health badly on the long run." KAU15.*

On the contrary, few participants suggested that high income and wealth can facilitate the adoption of healthy lifestyle. They believed that depending on servants and chauffeurs to do the housework can give them more control on how they spend their times. Mrs Huda explains:

> *"If a person is wealthy he can afford a gym membership. For women, they can have a maid to help with housekeeping and looking after the children so that they get more time to take care of themselves and exercise. Well I don't have a maid and I live in a 2 level house and it takes me so long to have all the housework done. If I had a helper I may have some free time."KAU08.*

In brief, Participants had concerns about their personal finances and the influence it has on their behaviour change attempts. For some, low income was inhibiting factor to their willingness to change. Whereas for others, wealth was associated with sedentary behaviour and lower levels of physical activity.

6.2.5.3 Time constraint

Time constraint due to caregiving responsibilities was a recurrent barrier cited by participants, especially those with families. Female participants with younger children identified their family responsibilities as both the principal life

priority and the foremost barrier to lifestyle change. Mrs Huda and Nora's comments reflected this well:

> *"I occasionally exercise at home but I don't always have the time and energy .. I never go to the gym. Time is a problem for me because there is no one to look after my children.. My older children go to school but the little one is with me all the time. I am a mother of 4 children and they are my first priority" KAU08.*

> *"I do not have time [to go to the gym]. I work full time. I wake up before dawn everyday. I go to work at 7:30 and get back home at around 4 o'clock. I am a wife and mother so I have million things to do. I go to bed early because I am always exhausted. I have a very tight schedule and too many responsibilities"KAU18.*

Many participants indicated that work commitments made finding the time to be physical active very challenging. Mr Abdullah summarised the words of many:

> *" Lack of time is my biggest issue. My job is very demanding and takes most of my time. How would I find time and energy to exercise if I work 10 hours a day?" KAU03*

6.2.5.4 Policy regulations

Most of the participants in this study were unaware of the existing public and governmental initiatives to promote healthy lifestyles. These include national awareness campaigns, smoking cessation clinics or toll free services. They agreed that most of the awareness programmes are limited to prevention and management of epidemic and communicable diseases. Mrs Nora explains:

> *"I think we now see more awareness campaigns and events compared to before. We see them at shopping malls, schools*

and universities. The focus is more on epidemic, or if I can say trending, topics such as Corona virus and stuff. Importance of healthy eating and physical activity and heart health awareness programmes are rarely seen." KAU18.

Referring to lack of public awareness programmes and multi-sectorial collaborations, participants made suggestions for improvement including suggestion for developing cardiac rehabilitation programmes to support lifestyle change after discharge from the hospital. Mr Abdullah recommended collaboration between the hospital and private facilities to provide tertiary services to cardiac patient:

"The Hospital has a responsibility toward me as a person living with heart condition. Motivate me to adopt a healthy lifestyle. For example, if this hospital does not have enough facilities like rehabilitation why not to refer me to private facilities where I can get these services for free or with a discounted price?" KAU03.

Similarly, Mr Ali suggested a deliberate collaboration among various sectors in developing public awareness campaigns for effective implementation and improving efficiency:

"To minimise the influence of the culture on our eating habits there should be a collaboration between the media, the national health services and the food market. There should be an increased awareness about not only the importance of healthy eating and exercise, but also the harmful effects of consuming fatty food and sedentary lifestyle." KAU07.

The importance of clarity and simple language to deliver health messages were seen as major factors to enhance the efficiency. Information about healthy eating and physical activity was particularly important:

The flyers or TV commercials should use a very simple language and attractive way to reach all levels of the community, especially the limited educated housewives. They

are the ones who will be preparing the food. Focusing attention on the young generation and providing lectures about healthy eating habits at schools is important too. Changing and shaping young minds is way easier than changing older minds." (KAU07- Ali).

"They are trying to raise the awareness regarding major health issues but the problem is how people are responding. I think the way they deliver the message matters. It has to be in a friendly simple way. Not by threatening or scaring people". (KAU13 – Ayman).

6.2.6 Theme 6: Personal characteristics

Personal characteristics taken into account are the individual traits of a person and his/her intrinsic characteristics that may impact the attitudes and perspectives toward engaging and maintain healthy lifestyles, provided that other structural and contextual challenges are overcome. Within this theme, participants' levels of health literacy, willpower and self-determination, and their perceived self-efficacy will be presented and discussed.

6.2.6.1 Levels of health literacy

Health literacy skills can be defined as 'the personal characteristics and social resources needed for individuals and communities to access, understand, appraise and use information and services to make decisions about health' (WHO, 2017b). In the present study, health literacy skills show strong associations with level of awareness of healthy lifestyle and CVD risk and education level.

Knowledge of what constitute a healthy lifestyle was generally high among interviewees. Most participants recognised the central role of lifestyle choices including diet, smoking behaviour and physical inactivity in the development of CVD. They correctly identified a number of foods as being part of heart healthy diet, including low-fat foods. They suggested that they should consume plenty of fruits and vegetables as well as foods high in fibre. Although they were not clear as to specific recommendations and guidelines, the majority highlighted the importance of watching portion sizes and having a well balanced diet with less unhealthy food choices. The following quotations illustrate this:

> *I try to eat healthier food choices. I don't skip meals especially the breakfast. My wife cooks with olive oil instead of butter and saturated fats. We eat chicken and fish more than red meat. Fish only not shrimp because it is high in cholesterol. We don't eat fried food. Only grilled or oven baked. And I eat fruits for dinner almost every day." (KAU15 – Omar).*

> *"I am committing myself to a very healthy lifestyle for a long time now and I am doing it. I eat plenty of fruits and vegetables. I rarely eat red meat. I eat seafood a lot. I always shop from the organic and healthy products section at the grocery stores. I drink a lot of water to stay hydrated. I drink Moringa organic tea every day. And I don't eat fatty and oily food" (KAU11 – Farah).*

Participants also talked about several types of physical activities that would be good for their heart health, including walking, running and any activity that raise the heart rate up. However, it was evident that some participants were feeling fearful of strenuous activities and confused about the recommended level of activity. With prompting, participants also revealed that part of their confusion regarding level of physical activity came from the mixed advice they receive from lay people. Mrs Laila states:

"You know I am very confused. After the catheterisation, everyone around me, including my children, instructed me not to walk a lot and be active. They said it is not good for me. I met a colleague once and while chatting he told me that he had undergone a cardiac catheterisation 2 years ago and was in a good shape. I asked him whether I should walk or not and he told me I have to walk at least 3 times a week. Whom should I listen to?" KAU12.

Although participants were knowledgeable about what constitute a healthy lifestyle, misperceptions about their own risk of developing the disease was prevalent. When asked what they think caused their illness, it was widely believed that external factors including hereditary and stress are the causes of their illness and not their behaviours and health habits:

"I do not think it is genetic. No one had a heart condition in my family. My father was hypertensive and diabetic and had renal failure at later age. Nor is my lifestyle. I do not think that my lifestyle caused my illness. I eat moderately; I am active and was not a heavy smoker. Could be my anger issues!! I don't know"(KAU18 – Nora).

I don't think my lifestyle caused my illness. I have never smoked in my whole life. It could be something genetic. Because my brother and sister both are diabetic. But again, my mother and father died without complaining of any illness. It supposed to come from them [looking confuse]. I have never thought of that before and it doesn't matter now because I already have the disease." (KFH19-Ahmad).

Level of education was viewed by the majority of participants as a powerful force for changing their behaviours. They identified illiteracy as a major barrier to accessing and understanding basic health information. One of the consequences was a reliance on other people, often family members, to access and interpret health information on their behalf. Mr Ali comments:

"Sure being educated will make us more aware about the importance of adopting and maintaining healthy lifestyles.

There is no doubt in this. Illiterate people will not be able to read instructions or tips on how to stay healthy or how to manage your disease. They will be dependent on others. Education makes a huge difference."KAU07.

There was also recognition that education could motivate individuals to engage in healthy lifestyles, given their awareness of the harmful effects of unhealthy behaviours:

"Level of education is very influential. In fact it is one of the most important factors. How could a person know about the harmful effects of smoking, sedentary lifestyle and unhealthy eating habits if he or she was not properly educated? Education is the basis of community's development. Education shapes the mind of people and helps them make better choices." KAU01- Mohammed).

"In general, educated individuals are closer to do the right thing compared to those with low education levels. In everything in life, not just health related. In other words, proper education makes people capable of making right decision in their lives. (silence) I believe that educated people value their health highly, which in turn make them more likely to choose healthier lifestyles." (KAU15- Omar).

Findings confirmed that for the most part, participants have a high level of understanding about the role of healthy lifestyle in reducing risk and the types of food and activities that are most beneficial, but they have difficulty in putting their knowledge into practice. It also highlights the influence of level of education on participants' decisions to engage in healthy lifestyles.

6.2.6.2 Willpower and self-determination

Analysis revealed that some participants have shown a lack of willpower and willingness to change their lifestyles despite favourable environments,

whereas some others have indicated that their strong willpower and self-determination have made adoption and maintenance of healthy lifestyles possible.

Limited willpower has been cited by several participants as a primary barrier to quit smoking. Mrs Farah, who has been smoking cigarettes for two decades, identified her lack of willpower as the most challenging factor. She talked about her several failed attempts to quit smoking leaving her with only one option, which is fasting. She forces herself to fast thorough out the year to decrease the number of cigarettes she smokes per day:

> *"I have tried several times to quit smoking but nothing seems to work. I will be honest with, I am weak willed when it comes to smoking and I need to be forced to not smoke. Fasting does that for me. Now instead of smoking 2 packets in regular days, I smoke half a packet only. That's quite an improvement….My biggest challenge is my lack of willpower to stop smoking. I mean I am very decisive and hard on myself on everything in my life, except with smoking. The fact that I'm fasting to control my smoking is a proof that I don't have the strength and desire to quit smoking, so I am forcing myself to do it. But it is working" KAU11.*

Participants spoke of their inability to constantly eat non-traditional food. They explained their attachment to traditional 'unhealthy' food and described how disregarding the flavour of food for the sake of health could be a true challenge. They believed some personal shortcomings decrease their abilities to change diet. Mr Ali expressed his challenge with traditional food:

> *My biggest problem is my eating habits. It is very hard for me to eat healthy. We all Saudis have the same problem with our traditional food I guess. I don't want to make excuses for myself but it is really hard. I don't have the willpower to give up traditional food and change my diet. So I never follow any diet plan, I eat whatever I want. Yet I try to balance my unhealthy eating habits with a lot of exercise." KAU07.*

It was clear for participants that willpower is a necessary component of healthy eating. They were aware that resisting temptation in an environment where unhealthy food choices are everywhere is likely to deplete willpower. Hence they try to avoid the temptation in the first place. Mrs Mona expressed her challenge:

> *"Look, I know myself very well, I am weak willed when it comes to food. I like tasty food. However, I had to change after my illness. Therefore, I made a rule that I don't taste the food that I am not allowed to eat. Not even a bite. I just excuse myself and say I am sorry I can't eat. Because I know if I taste the food, it will be hard on me to stop. They are very understanding and supportive. I do the same when I go to weddings. I don't go to the buffet section because it will be hard to resist." KAU06.*

However, participants who perceived themselves as well disciplined and determined have successfully changed their lifestyles and identified this personal characteristic as a motivator to maintain their behaviours. Mr Faisal and Mr Abdullah commented:

> *"I have to take my medications, follow-up with my doctors and follow their instructions. I have successfully adopted a healthy lifestyle. I am determined and insistent. When I put something in my head, I do it. These personal features help me to stick to my healthy lifestyle." KAU17.*

> *"I work with smokers, my friends are smokers, but I have never felt the desire to smoke again, thanks god. (Laughing) I remember once at work one of my colleagues asked me for a cigarette, I said sorry I don't have. He said what. How is that possible? You out of anyone else would never imagine would quit smoking. I said it is possible and I did. I believe my strong willpower helped me" KAU03.*

This evidence suggests that willpower and self-determination appears to be an important factor that influences the decisions of Saudis to engage and maintain healthy lifestyles. Thus, understanding the role of willpower in developing effective interventions for Saudis with established CVD may help guide people toward making healthy choices, such as eating well, exercising and avoiding tobacco use.

6.2.6.3 Self-efficacy

Self-efficacy is a key construct popular within different theories of health behaviour. It is defined as "the belief in one's capabilities to organise and execute the courses of action required to produce given attainments" (Bandura, 1997). When participants were asked whether they are willing to maintain their healthy lifestyle there was variation in their levels of self-efficacy. Many reported feeling confident in their capabilities to maintain their behaviours. However, a minority of participants reported diminished self-efficacy and not feeling confident and motivated to engage or maintain healthy lifestyles.

Participants who perceived high capability to accommodate their illness and change their behaviours reported that a supportive social environment encouraged them to engage in healthy lifestyles. Mrs Fatima who had previously struggled with physical activity explained how the support she receives from her family motivates her to exercise. She said:

> *"I see myself maintaining this lifestyle. I am confident in my capabilities. I can walk everyday because I have the support I need. My daughters are very active and this motivates me. It is very fun and enjoyable when you have company while you exercise" KAU14.*

Minority of participants reported diminished self-efficacy to continue being active and eating healthy diet. They stated that the lack of social support and loss of motivation would make sustaining their healthy habits very challenging. Ms Amal spoke of losing motivation to be active without her friend:

> *"I had a very close friend who loves to walk every other day. She encouraged me to walk with her. We used to walk for long distance and never get tired or bored. You know walking with a partner is so much fun and time flies before you even realise. But now that she is gone, I don't think I will be active. I don't like to walk alone" KAU04.*

Findings highlight the interplay between the perceptions of self-efficacy, motivation and social support. Greater perceived availability of social support was tied to participants reported self-efficacy and motivation toward adopting healthy lifestyles. However when less social support was available, participants reported diminished self-efficacy to maintain their lifestyles.

6.3 Summary of findings

The findings presented in Figure 14 illustrate that the factors influencing Saudis with CVD decisions to engage and maintain healthy lifestyles are manifold. This study has pointed to several causes accounting for individuals' lifestyle behaviours, namely their sociocultural norms and expectations, perceptions about illness causation, health status and wellbeing, physical environment, structural constraints influences and personal characteristics. However, the dominant barrier to the adoption of healthy lifestyle was attributed primarily to constraints imposed by the culture and social norms. This suggests that individual level factors have an impact on some participants to change their behaviour. Lifestyle behaviour is, however, strongly influenced by the sociocultural norms in which individuals are embedded, indicating that while the individuals have the ability and intention

to change, any changes they made were largely shaped by the social and cultural factors. The findings of this study support the need for comprehensive lifestyle change intervention strategies that take account of the complex array of contextual factors that promote or inhibit the adoption of healthy lifestyle. The following chapter (Chapter 7) will provide a comprehensive discussion and interpretation of the findings revealed by this research through the lens of the social ecological model by categorising and mapping the findings under five levels: intrapersonal, interpersonal, institutional, community and public policy factors (McLeroy et al., 1988) as presented in Figure 15 in Chapter 7 section (7.1).

Chapter 7 – Discussion

7.1 Introduction

The synthesised findings of the study presented in the previous chapter (Chapter 6) indicated that the factors that influence the adoption of healthy lifestyles among Saudis living with CVD exist at multiple levels of influence. Given the complexity of understanding human behaviour, it is insufficient to analyse behaviours within single level of influence, as social, cultural and environmental factors need to be taken into account when attempting to understand these behaviours. The discussion provided in this chapter attempts to construct a detailed interpretation of the emergent themes from the findings through the lens of the social ecological model (McLeroy *et al.,* 1988); themes that are considered within the context of existing literature (Chapter 4, section 4.2.5). In line with this model, all the factors identified as influencing the decisions of Saudis to adopt healthy lifestyles are categorised and mapped onto the predefined five levels of the social ecological model: intrapersonal, interpersonal, institutional, community and public policy levels to provide a thorough and broader understanding of the interplay among the multilevel and interactive factors that were identified by study participants, as presented in Figure 15 below. However, the factors that appeared to have the most significant impact (i.e. religious beliefs, family values, sociocultural norms) were represented with larger boxes compared to other factors, hence representing their higher influence on participants' decisions to adopt and sustain healthy lifestyles after experiencing cardiac events. Following on from this, the presentation of the conceptual model developed from the most significant findings and underpinned by the social ecological model of health behaviour is presented in figure 16 in Chapter 8. This brings together the factors associated with CVD patients' reported lifestyle behaviour within the Saudi context and outlines the study's unique contribution to new knowledge in Saudi Arabia for the first time.

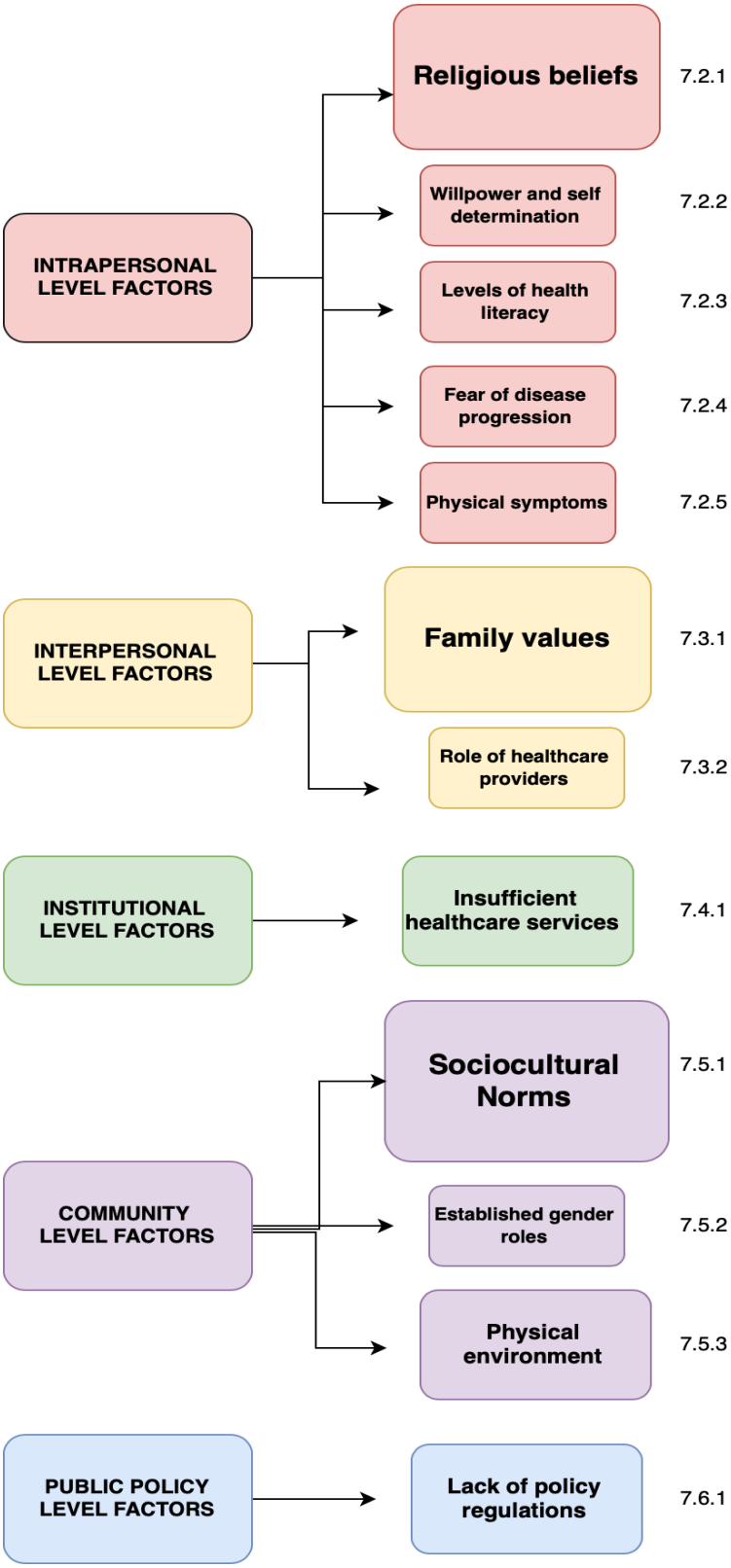

Figure 15 Mapping the study findings onto the social ecological model

7.2 Factors influencing the adoption of healthy lifestyles: intrapersonal level

According to McLeroy et al. (1988), the intrapersonal factors taken into account are the intrinsic characteristic of a person, the individual traits, his/her perceptions and beliefs that may influence their attitudes and behaviour regarding a series of events. Within the intrapersonal level, several factors from the data analysis were revealed as relevant in the present study, including religious beliefs, willpower and self-determination, health literacy levels, fear and health status. However, the influence of religious beliefs was considered/or identified as the strongest among the intrapersonal level.

7.2.1 Religious beliefs

Religion and faith provided the participants with a context in which to understand, situate and cope with their illness. Muslims in general consider Islam as not only a religion or a set of spiritual beliefs, but also as a way of living. Health and Islamic traditions and beliefs have been long integrated in the literature (Bahar *et al.*, 2005; Abdel-khalek, 2011; Assad, Niazi and Assad, 2013; Zaidi, 2017). Many verses of Holy Quran and Islamic prophetic traditions contain physical and spiritual ways to enhance the health of individuals and manage and prevent mental and physical illnesses (Al-Yousefi, 2012).

For the present study, it was evident from participants' accounts that Islamic beliefs, such as fate and a person's responsibility to care for and nourish their physical body, were tightly intertwined with their lifestyle practices and supported their positive lifestyle choices rather than interfering with them. Participants were thankful and grateful for their conditions and considered

their health as a gift from God that cannot be wasted. Such belief was positively encouraging them to maintain their gifted health by engaging in healthy lifestyle practices. This positive influence of religious beliefs on individual's lifestyle behaviour has been documented in previous research in Islamic countries other than Saudi Arabia (Donnelly *et al.*, 2012; Park, Al Agili and Bartolucci, 2012; Alalawi, 2018). However, the study findings offer insights on the positive influence of religious beliefs on the lifestyle behaviours of Saudis living with CVD for the first time. Despite this influence, embedded in some participants' narratives was a faith-based belief in illness predetermination or external locus of control (Lefcourt, 1982). Some participants believed that they have been fated to have heart disease or held a strong belief in the power of heredity. As a result they attributed their current illness to their parents or siblings who have suffered from similar conditions, believing there was nothing they could do to prevent their illness. This belief led few respondents to feeling powerless in influencing the progression or long-term management of their illness. This notion of 'fate' and perceived lack of individual control in developing illness has been identified in other research as a key factor to non-adherence with cardiovascular health promotion advice among Muslim South Asian populations (Darr, Astin and Atkin, 2008; Stafford, 2008; Galdas *et al.,* 2012; Astin, Horrocks and Closs, 2014; Iqbal, 2014). Nevertheless, it is important to note that although religion and faith influenced how participants accepted and managed their disease, it did not preclude their decisions to engage in healthy lifestyle practices to manage their conditions.

Majority of the participants stressed that although their belief in illness determination is part of their faith, they acknowledged each individual's responsibility for protecting their own health. Hence, they were still willing to make lifestyle changes to stop the progress of their disease and prevent further complications. This finding of perception of illness causation as a motivator to behaviour change is consistent with previous studies that have

explored the influence of religious illness beliefs on chronic disease management in Saudis other than CVD (Alqahtani and Salmon, 2008; Alqahtani, 2015), but is at odds with previous studies in other Muslim South Asian communities (Darr, Astin and Atkin, 2008; Iqbal, 2014). This finding reflects how illness beliefs of Saudi patients contribute to different views compared to other Muslim populations. Considering this finding, it appears that the lifestyle habits of cardiac patients in Saudi Arabia are best understood within the context of their specific religious health beliefs and perceptions of illness causation. If healthcare interventions are not consistent with their belief systems, it is unlikely that their behaviour will change. Therefore, healthcare professionals in Saudi Arabia should acknowledge that religion affects all aspects of patients' lives and cannot be separated when providing care. They have a duty of a care to deliver holistic and culturally specific care for patients of diverse cultural background (Blankinship, 2018). It has been argued that healthcare professionals' understanding of Islamic beliefs and religious implications can facilitate the delivery of appropriate care in a culturally sensitive manner (Ezenkwele and Roodsari, 2013; Attum and Shamoon, 2019). Persuasive healthy lifestyle messages targeted at Saudi patients should reflect an understanding and use of Islamic health perspectives and their impact on health behaviours. Such messages should also contain deeper insights that demonstrate the connections between health and religion perhaps by including verses from primary sources, such as the Holy Quran and Sunnah. Using verses from the Holy Quran to deliver health education messages may help impart a powerful message to initiate and sustain positive health behaviours in a meaningful and effective manner (Gupta, 2015).

7.2.2 Willpower and self-determination

Analysis of participants' narratives revealed that some participants have shown a lack of willpower and willingness to change their lifestyles despite

favourable environments, whereas some others have indicated that their strong willpower and self-determination have made adoption and maintenance of healthy lifestyles possible. Such opposing narratives reflect that the notion of willpower and self-determination can have both positive and negative influences on Saudis' decisions to engage in, and sustain lifestyle changes. Participants who perceived themselves as well disciplined and determined were able to mobilise internal resources to achieve self-determined change and cope with the challenges of making lifestyle modifications. They identified this personal characteristic as a key component of successful behaviour change and maintenance. This finding complements other studies that have emphasised the importance of personal characteristics, such as self-discipline and willpower, as facilitating factors to maintain lifestyle changes among CVD patients in contexts outside Saudi Arabia (Peterson et al., 2010; Murray et al., 2013; Dunn et al., 2014; Nicolai et al., 2017).

A counter perspective on the influence of willpower and self-determination on lifestyle change was offered by some participants. Lack of self-motivation and limited willpower was perceived by some participants as a barrier to making dietary modifications and smoking cessation. Participants were unwilling to change what they eat or how their food is prepared due to a taste or a particular food being a staple; highlighting the power of habit and culture upon human conduct. Participants spoke about their inability to give up traditional food and change their old habits for the sake of their health. This negative influence of willpower and self-determination resonates with past research conducted in South Asian contexts (Iqbal, 2014; Patel et al., 2014), which reported lack of willpower and self-determination to change as a barrier to the adoption of healthy lifestyles among patients living with CVD.

Thus, this evidence suggests that willpower appears to be an important factor that influences the decisions of Saudis to engage and maintain healthy lifestyles. In the perspective of the self-determination theory, (Ryan and Deci, 2000; Deci and Ryan, 2012) maintenance of behaviours over time requires that patients internalise skills for change by developing a sense of autonomy and competence. Thus, behaviour change interventions that afford autonomy and support confidence are likely to enhance adherence and health outcomes (Ryan et al., 2008 Girelli et al., 2016). Developing intervention for Saudi CVD patients that support their psychological needs can improve their adherence to the recommended preventive strategies following their cardiac events, thereby improving their outcomes (Donnachie *et al.*, 2017; Gourlan, Sant and Boiche, 2014).

7.2.3 Levels of health literacy

With regards to participants' levels of health literacy and knowledge about CVD risk and healthy lifestyle, most of the participants recognised the significant role of changing lifestyle behaviours on CVD risk as well as having sufficient understanding of what constituted a healthy lifestyle. The majority of participants were knowledgeable about the importance of consuming high amounts of fruits and vegetables and reduced amounts of saturated fats and fast foods. They demonstrated sufficient understanding of the value of engaging in physical activity routines, but some confusion existed within the sample about the level of physical activity needed to give health benefits without causing harm. This finding runs counter to the literature that identified lack of knowledge and awareness about what constitute a healthy lifestyle as an important personal barrier to healthy eating and physical activity among Saudis (Mushabeb Al Farwan, 2011; Alharbi, 2016). Further, previous work exploring Saudis' knowledge about CVD risk reported that participants mostly recognised their increased CVD risk but were generally sceptical about the

role of lifestyle behaviours and their intention to change (Al Alwan *et al.*, 2013; Alissa, 2017). This current study's findings challenge this binary construct, drawing attention to participants' awareness of the major role of lifestyle change in the prevention and management of their illness. A possible explanation of this observed incongruity in this study, when compared with other research, is that all participants in this study had been diagnosed with CVD for at least two years, and therefore had received lifestyle advice that has increased their health literacy and awareness levels.

Despite their awareness, many did not engage in healthy lifestyle behaviours and often perceived individual and contextual factors as barriers preventing them from the adoption of healthy lifestyles. For example, many participants had been aware of their increased risk of developing a second MI if they continued smoking or consuming high dietary fats, but they still had difficulty translating their knowledge to behaviour change and often identified other individual, social and environmental factors as influencing their behaviours. From a theoretical perspective, the theory of planned behaviour depicts that actions to change behaviours depend on previous knowledge in the form of intention (Ajzen and Fishbein, 1980; Ajzen, 1991; Ajzen, 2011). However, Greve (2011) argues that in cases where individuals do not change their behaviours, it does not falsify the logical connection between intention and actions. It would mean that the intention was not strong enough to reach a threshold needed to turn intentions into actions, or that there are other stronger factors influencing their actions (Greve, 2001; Meusburger, Werlen and Suarsana, 2017). Hence, it is safe to conclude that increased awareness of CVD and healthy lifestyle behaviours among Saudis, as suggested by other studies involving Saudi participants, may not be sufficient to bring behaviour change if the perceived individual and contextual factors identified by the participants were not addressed.

7.2.4 Fear of disease progression

Fear also emerged as a significant intrapersonal factor influencing participants' decisions to engage in healthy lifestyles. Participants were living with the fear of disease progression or recurrence. However, more importantly they were concerned with how their illness could impact on their physical abilities and the lives of everyone around them. It appeared that the social sharing of health knowledge between patients living with CVD induced fear of disease progression among those who were more recently diagnosed. Fear was perceived by participants as a motivator for them to look after their health knowing how debilitating their disease could be if progressed. Patients also described how their sense of vulnerability to developing another attack had motivated and fuelled their desire to change their lifestyles into healthier ones. This finding resonates with past research looking at the influence of fear on the attitudes, intentions and behaviours of people living with CVD outside Saudi Arabia (Condon and McCarthy, 2006; Peterson *et al.*, 2010; Junehag, Asplund and Svedlund, 2014), but reported for the first time among Saudi population living with CVD. It is appropriate to conclude that the importance of recognising and supporting this concern in practice is paramount for Saudis.

Utilising fear to motivate individuals towards changing their behaviour has been a dominant strategy in the social marketing of public health risks (Simpson, 2017). 'Fear appeal' attempts to create anxiety and provoke an emotional response to persuade target audiences to modify their behaviours in the interests of their health (Lupton, 2014). However, it has been argued that the moral and ethical implications of this strategy can be counterproductive (Maloney, Lapinski and Witte, 2011). To overcome these issues, Peters et al. (2013) suggested that while a piece of communication that focuses on a threat conveys the susceptibility and severity of that threat, one with a focus on self-efficacy emphasises one's ability to enact a potential

response to block or reduce the threat. This view is supported by a meta-analysis study which concluded that the effectiveness of fear appeal on influencing attitudes, intentions and behaviours is enhanced when combined with high self-efficacy messages (Tannenbaum *et al.*, 2015). Therefore, to tackle the impact of CVD, healthcare providers can benefit from utilising fear appeal strategies combined with high self-efficacy messages, in order to ensure that lifestyle change interventions enhance responses and self-efficacy, thereby improving patients' outcomes.

7.2.5 Physical symptoms

A diverse range of chronic conditions and physical problems caused distress and difficulty for some participants' attempts to maintain healthy lifestyles, particularly physical activity routines. The extent to which respondents were affected by their physical symptoms also varied considerably. Patients were determined to overcome their difficulties but struggled to make or sustain changes in the long run. The difficulty of dealing with a range of physical symptoms has previously been recognised among patients in the process of changing their lifestyles after cardiac events in contexts other than Saudi Arabia (Rogerson *et al.*, 2012; Huffman *et al.*, 2015), and fatigue was perhaps the biggest common factor. Therefore, interventions with non-active Saudi CVD patients to promote physical activity should consider activities that are specific to the physical abilities of those patients or can be modified to the individual capabilities as appropriate to ensure safety and to reduce any risk of harm.

7.3 Factors influencing the adoption of healthy lifestyles: interpersonal level

The next level of the social ecological model considered in this discussion is the interpersonal one. Interpersonal factors refers to the processes which shape the dynamics making up primary groups including family members, friends and peers, that provide social identity, support and role definition (McLeroy *et al*., 1988). Such relationships are a reflection of the individual's surrounding environment, a context that greatly contributes to building his/her behaviour and attitudes (McLaren and Hawe, 2005; Richard, Gauvin and Raine, 2011). With respect to the present study, several types of relationships and connections are considered relevant to the interpersonal level, impacting upon the decisions of Saudi cardiac patients to engage in healthy lifestyles. It includes relationships with family members and healthcare providers.

7.3.1 Family values

Analysis of the interviews data revealed that perhaps the family is the most significant interpersonal entity impacting upon participants' behaviour. This significance is due to the high influence families have on the formation of individual's perceptions, beliefs, and thereby lifestyle behaviour change. As previously mentioned in the background Chapter (section 2.3.2), Saudi families are collectivistic in nature, in which members work very hard to support each other, be a cohesive group and keep unity at the forefront. Saudi families stand proud of their originality as Muslims, because Muslim families are encouraged to provide a secure healthy environment for their members and guard them against passions engendered by desires and whims (Dhami and Sheikh, 2000). The impact of these family values on participants' abilities to make lifestyle changes was reflected in their testimonials.

Strong family bonds, together with ongoing encouragement and support appeared crucial in motivating participants to engage and maintain their lifestyle changes. Respondents recurrently expressed their gratitude for the emotional and practical support their families provided them with, such as cooking healthy meals for the entire family, exercising as a group or sharing knowledge and giving advice about healthy lifestyles. It became clear in the present study the extent to which male participants in particular valued supportive wives and stressed on their central role in helping the husbands to cope with their challenging circumstances. This finding mirrored the literature on the positive influence of family support on patients' adoption and maintenance of lifestyle behaviour change after cardiac events in contexts other than Saudi Arabia (Donnelly *et al.*, 2012; Rogerson *et al.*, 2012; Murray *et al.*, 2013; Zhang *et al.*, 2016). However, provides a new knowledge for the positive influence of family members on lifestyle behaviours of Saudis living with CVD.

Although male participants stressed how pivotal the support their wives provided in controlling their lifestyle habits was, female married participants' views were contradictory to those reported by their male counterparts. Some female participants were constrained by the established gender norms of the society, in which men's controlling attitudes toward their wives is permissible and legally sanctioned. As a result, many wives were prohibited from exercising outdoors or joining a gym. They were also obliged to cook and eat the traditional foods that their husbands were accustomed to eating, making it very challenging to change their behaviours. This negative impact of gender norms on Saudi women's capacity and empowerment to change their lifestyles was also identified by another qualitative study conducted in an Islamic country, the Pakistan, during which women indicated that they were bound to certain family traditions and patriarchal norms that hindered their abilities to consume healthy diets (Barolia, Clark and Higginbottom, 2017).

Whilst both male and female participants identified the family as an influential factor, there was a gender-based difference regarding the extent of family influence on decisions to uptake healthy lifestyles. In light of the sociocultural context of Saudi Arabia, this difference is typical and expected. Men always receive higher flexibility and priority in their lifestyles compared to women (Al-Rasheed, 2013). Developing gender specific and culturally sensitive interventions that acknowledge the cultural challenges that Saudi women face while transitioning into healthy lifestyles may improve the subsequent uptake in services (Lovell *et al.*, 2014; May *et al.*, 2007).

Thus, the findings of this study demonstrated a direct positive relationship between family support and lifestyle behaviour change among Saudis living with CVD, while also unveiled that gender norms and values are tightly interwoven with lifestyle behaviours of Saudi married women. Interventions that aim to improve cardiac patients' adoption of healthy lifestyles need to take account of the sociocultural factors and the role of family identified in this study to promote the engagement and maintenance of healthy lifestyles among Saudis. Gender norms will be further discussed under the community level factors section within this chapter (section 7.5)

7.3.2 Role of healthcare providers

Along with the important influence participants' immediate social network, namely family members, had on their lifestyle behaviours, the influence that arose from the broader social network, namely the healthcare providers, appeared to be important. Interactions with healthcare providers were seen as very important aspects informing the adoption of healthy lifestyles and which affected the participants' entire experiences with healthcare facilities. Disappointment with services occurred when participants were disrespected,

'unheard' or rushed through consultations, particularly when the conversations were about lifestyle advice. Such negative or counterproductive circumstances often led to a patient's intentions to access care being significantly reduced. Negative experiences with healthcare providers, including poor communication and lack of empathy or responsiveness, have been highlighted as a challenge in previous research conducted in Western countries (King *et al.*, 2007; Cole *et al.*, 2013; Nicolai *et al.*, 2017). It also appeared that all participants who reported lack of communication with their physicians emphasised their desire and need to spend more time conversing with them and demanded improved accessibility to constructive unhurried consultations.

Many also complained that lifestyle advice and support were just limited to the time of diagnosis and stressed the need for follow-up support. This finding provides insights on CVD patients experiences with healthcare providers in Saudi Arabia for the first time and suggests that healthcare should be respectful and responsive to an individual's preferences, needs and values, which is collectively known as "patient-centered model of care'. The key characteristics of patient-centered care involve enhancing communication between healthcare providers and patients and providing individualised information based on patients' own values and experiences (Walsh *et al*., 2012). Incorporation of patient-centered care concept in the design of secondary prevention of CVD has been widely advocated in the literature (Coulter *et al.*, 2015; Constand *et al.*, 2014; Walsh *et al.*, 2012; Dambha-Miller *et al.*, 2016; Murphy *et al.*, 2009; Fors *et al.*, 2016). A systematic review of 12 randomised controlled trials focusing on nurse-led patient-centered care for secondary prevention of CVD revealed improved patients' smoking habits, adherence toward physical activity advice and total cholesterol level in short- to medium-term (Chiang *et al.*, 2018). The intervention was also favourable in improving the patients' health related quality of life.

Moreover, the identification of the need for health professional support during patients' follow-up emphasises the need to explore the continuity of support for patients as they adapt to their illness, especially with the lack of cardiac rehabilitation centres in the Kingdom. Such developments could help provide the optimal heart health for cardiac patients and enhance their adherence to prescribed treatment and lifestyle advice (Balady *et al.*, 2007; Schopfer and Forman, 2016). Further, this study revealed that most of the interactions that participants discussed were those with doctors and very rarely with any other healthcare providers, such as nurses and health educators. This could be explained by the medical dominance feature of the healthcare system in Saudi Arabia, coupled with the absence of national scope of nursing practice within the domains of psychosocial and communication aspects of patients' care (Aldossary, While and Barriball, 2008; Aldossary, 2013). The role of nurses in improving the accessibility and cost effectiveness of healthcare services, enhancing cardiac patients' adherence to treatment and improving their self management behaviours is well established in the literature (Bosch-Capblanch *et al.*, 2007; Keleher *et al.*, 2009; Kemppainen, Tossavainen and Turunen, 2013; Rega *et al.*, 2014). Addressing this lack of nursing role legitimacy in Saudi Arabia may ultimately have a positive impact on the quality of patient care delivery (Woo, Lee and Tam, 2017). Recommendations on ways in which nurses can promote healthy lifestyles changes, following CVD events, are further discussed in Chapter 8 (section 8.5).

Thus, it can be argued that interpersonal factors play a considerable role in shaping cardiac patients' lifestyle behaviours. Therefore, lifestyle interventions should develop more of a focus on social support, where families may need to be included in intervention programmes. Such integration between healthcare and social support can more effectively tackle the challenges of transitioning into healthy lifestyle among Saudi cardiac patients. Additionally, strategies to promote healthcare providers' communication skills and knowledge of specific

cardiac patients' needs with more a focus on patient-centered model of care should be considered when developing interventions for this particular population. Nevertheless, all the factors influencing individuals' behaviours are interrelated; hence, any action taken or intervention developed will only be fully effective when correlated with the other factors involved at individual, community, institutional and policy levels.

7.4 Factors influencing the adoption of healthy lifestyles: Institutional (organisational) level

In line with the social ecological model, the rules and regulations according to which a particular organisation functions are deemed to have a strong impact on an individual's attitude, dictating his or her behaviour either consciously or unconsciously (McLeroy et al., 1988). Given this significant influence, organisations' involvement in the promotion of more positive health behaviour has been advocated widely (McLeroy *et al.*, 1988; Sallis, Owen and Fisher, 2008; Richard, Gauvin and Raine, 2011). Among the institutional or organisational factors considered in this analysis, healthcare services have been deemed to play an important role in shaping participants' attitudes towards the adoption of healthy lifestyles. Interestingly, analysis of participants' narratives demonstrates that cardiac patients in Saudi Arabia seem to have high expectations regarding healthcare professionals, in terms of the information those participants should receive about the significance and strategies of changing their behaviours. Accordingly, the discussion around the institutional level of influence will be focused on the adequacy of healthcare services and their impact on patients' lifestyle behaviours.

7.4.1 Insufficient healthcare services

As the interviews revealed, participants considered the healthcare services to be a high-impact factor likely to affect their attitudes toward making lifestyle changes. They reported actively seeking medical care by making appointments and visiting their physicians when they had a problem and described a mix of experiences, both positive and negative, which indicates that the quality of their medical experience was not always good or adequate. Negative experiences, such as long waits for appointments, lack of coordination of care between healthcare professionals and an insufficient/inefficient referral system were perceived and reported as barriers to making lifestyle changes. This finding echoes existing literature that addressed the impact of inadequate healthcare services on patients' attitudes toward the engagement and maintenance of healthy lifestyles in Saudi Arabia (AlQuaiz and Tayel, 2009; Al-Ghamdi *et al.*, 2018), but was not specific to cardiac patients. However, this present study provides new knowledge and uncovers the impact of insufficient health services on Saudis decision to adopt and maintain healthy lifestyles after CVD diagnosis.

From an organisational perspective, the interviews have additionally revealed that healthcare professionals, namely physicians, failed to meet or satisfy their patients' information needs. Participants' testimonials demonstrated that too often the issue of discussing lifestyle changes after cardiac events with physicians was disregarded, restricted to the time of diagnosis or considered secondary to other issues such as medication adherence. Such unsatisfactory experiences left the patients with unanswered questions and unmet information needs that were necessary to change their behaviours. It also appeared that none of the participants reported being transferred to a nutritionist or instructed to attend health promotion classes, reflecting a serious lack of health education services targeting this CVD population. In line

with this negative situation, Midhet and Fawzi (2011) suggested that enhancing the quality and scope of health education and referral to appropriate personnel for Saudi patients visiting primary healthcare clinics, would improve the practice and maintenance of healthy behaviours, thereby improving the patients' outcomes.

Thus, the findings highlight challenges with the Saudi primary and secondary care system; however, these were not identified as the main inhibitors to the interviewees' adoption ad maintenance of healthy lifestyles. Nonetheless, interventions that focus on improving health education services and care coordination, along with addressing the major inhibitors of lifestyle behaviour change identified in this study, may be useful in facilitating lifestyle change for Saudi CVD patients. Coordination of care would occur not only between healthcare professionals, but also with the patients themselves and their family members. Such an arrangement could provide patients with information on why they need to attend a given medical appointment or class, along with reminders and encouragement to attend their visits.

7.5 Factors influencing the adoption of healthy lifestyles: community level

Going beyond the influence of intrapersonal characteristics, interpersonal relationships and institutional factors on behaviour, the fourth level of consideration within the social ecological model underscores the need to account for the impact of community factors on individual behaviour. Community factors are either defined as relationships among primary groups to which individuals belongs or are defined in geographical and political terms (McLeroy *et al*., 1988). This view of community embraces the culture and social norms as well as the community's level of neighbourhood safety,

physical location, design or layout, and demographics (McLeroy *et al*., 1988). As the influence expands by moving further away from the intrapersonal level, the factors begin to have increased interactions with and influence on each other, pulling the level of control away from that of the individual and moving toward a larger scope of influence (Sallis, Owen and Fisher, 2008). With regard to the present study, community factors are conceptualised as the sociocultural norms and the built environment factors that can influence the individual's choices and decision-making with regard to healthy lifestyles.

7.5.1 Sociocultural norms

Embedded within the study participants' narratives were acknowledgements that they understand the connections between particular lifestyle behaviours and ill health. Although they recognised the necessity of making lifestyle changes, their choices were routinely determined by their cultural norms. Participants were regularly challenged to balance the demands of their cultural bond with the individual lifestyle changes that were recommended to them as secondary prevention strategies following their cardiac events. The study identified many aspects of culture and social norms that impact on individual attitudes with regard to dietary habits, physical activity and smoking behaviour.

One of the major sociocultural factors from the participants' perspectives was the value of consuming traditional food. The behaviour and gesture of consuming traditional food appeared to have multiple meanings attached to participants' lives. Such an act is perceived as a symbol of socialisation, an expression of cultural identity and a reflection of family and religious values (Sibai *et al.*, 2010; Al-Khudairy *et al.*, 2014). Such major role traditional food plays in the Saudi society had a negative impact on individuals' attitudes

toward dietary modification and made it challenging for many of the patients to maintain a healthy diet, given that diet's high saturated fat and salt contents (Selvanathan *et al.*, 2015; Adam, Osama and Muhammad, 2014). In addition, social gathering and weddings, in the opinion of some participants, were seen as possible contexts where individuals are challenged to adhere to their healthy, albeit restricted, diets. A major norm within Saudi culture is the social visiting and attending of social events. Family visiting is very important in Saudi culture, especially among young families who are socially obligated to visit their parents' home at least on a weekly basis. Moreover, families have to attend social events for marriages, births and deaths, alongside other social gatherings. With a small population, where people tend to have a large social network of relatives and friends, its members are obligated to interact with each other on many different occasions where they are expected, even required, to consume traditional foods (Adam, Osama and Muhammad, 2014; Alharbi, 2016; Al-Khudairy *et al.*, 2014).

Added to this situation is the fact that Saudi social mores reinforce an unhealthy way of eating, as visitors will be offered traditional food, dates and sweets as a symbol of hospitality. Hence, the fear of being seen as disrespectful by declining the host's offer, or the desire to correspond to the social expectations, forces participants to eat whatever is served as a means of social integration. Such a cultural practice largely hinders individuals from following a controlled diet, especially if a person is committed to a large number of social events or gatherings. These imposed social responsibilities set Saudis apart from Western countries in terms of this unique sociality. This important finding complements other similar studies that have suggested interplay between individual's dietary practices and the cultural norms of the society where they live (Darr, Astin and Atkin, 2008; Astin, Atkin and Darr, 2008; Galdas *et al.*, 2012; Iqbal, 2014). This finding also concurs with previous studies indicating that Saudis prefer consuming traditional high fat

food they are accustomed to eating despite their awareness of their increased risk of developing or exacerbating their CVD (Shara, 2010; Sibai *et al.*, 2010; Bakhotmah, 2012; Alissa, 2017).

The effect of such cultural norms further clarifies the study's findings and illustrates how this phenomenon has implications for the decisions regarding lifestyle changes after CVD diagnosis among Saudis. Therefore, understanding the lifestyle choices of the participants cannot be separated from the wider issues associated with their social norms and cultural values existing in Saudi Arabia. Healthcare providers and decision makers clearly need to identify opportunities and implement policies and programmes that promote healthy lifestyles and facilitate risk reduction strategies in the context of those sociocultural norms.

7.5.2 Established gender norms

As part of the sociocultural factors, gender norms were identified as a factor that impedes opportunities for Saudi women, in particular, to their attempts to live healthier lifestyles. Female participants reported that they have felt constrained by the cultural expectations to remain home, attend to household chores and prioritise family responsibilities; all issues that are perceived more urgent than their attempts to adopt a healthy lifestyle. Some women had to cook traditional and high fat food for their families, making adherence to a specific heart healthy diet difficult. These culturally enforced gender roles have led to resistance among some women to changing their behaviours in spite of their illness and willingness to change. This finding confirms the findings of Alharbi (2016) who identified the negative impact of the conservative Saudi norms and politics, particularly the need for guardian's permission and lack of freedom to exercise, on women's physical activity levels and their ability to live healthy lifestyles. Other studies conducted in South Asian countries have also highlighted the influence of cultural bias

towards men's health status, and the domination of men's preferences in all family and social activities on behaviour change attempts among women with CVD (Patel, Phillips-Caesar and Boutin-Foster, 2014; Patel, Phillips-Caesar and Boutin-Foster, 2012; Iqbal, 2014).

The findings also highlighted that some of the traditional practices, such as wearing 'Abaya' or the negative attitudes of men if women are seen exercising or walking alone in the street, can further limit women's abilities to engage in physical activity. It is worthy to note that these traditional societal boundaries are starting to change in line with the launch of an ambitious national transformational plan "Vision 2030" which was adopted as a methodology and roadmap for economic and developmental action in the Kingdom. The plan encompasses, in a number of domains, strategic objectives that aim to improve gender equality, women empowerment and promotion of a less conservative community, among other major economical political goals (Vision 2030, 2017). Yet, strong cultural values and beliefs remain, especially among older population and rural communities.

7.5.3 The physical environment

Besides sociocultural norms, the physical environment, in terms of neighbourhood context, transit options and accessibility to recreational facilities, appeared to exercise a further influence on Saudis decisions to engage and maintain healthy lifestyles. The heavy dependence on the automobile as the most feasible transit option, as opposed to active travel, was perceived by many participants as a barrier that hinders physical mobility. This perception was explained by Jeddah's hot weather especially in the summer and during the daytime. Added to this were concerns with safety, due to the lack of pedestrian crossing and missing pavements/sidewalks, so

making active pedestrian travel a definite danger. This finding complements other studies that have reported the impact of environmental factors on lifestyle behaviours in contexts other than Saudi Arabia (Pinter-Wollman, Jelić and Wells, 2018; Joseph *et al.*, 2015; Kowal and Fortier, 2007) yet reported for the first time among Saudis living with CVD. To overcome this barrier, modifying and restructuring the physical environment by increasing proximity of physical activity spaces, as well as increasing neighbourhood connectivity and walkability, and modifying the nature and layout of the street network seem to be practical solutions to increasing physical activity levels (Wilkie *et al.*, 2019). In terms of the influences of harsh weather, knowledge of how weather conditions affect physical activity can help policy makers and healthcare providers to adapt recommendations to mitigate its effects. The appropriate timing of sport or walking along with providing indoor opportunities during hot months may foster regular physical activity behaviours year round (Tucker, 2007).

Moreover, consistent with the findings of Jilcott et al. (2006), AlQuaiz and Tayel (2009) and Samara et al. (2015), the data revealed that a high proportion of the participants perceived lack of resources as a major barrier to physical activity behaviour, especially for females. This was not surprising, as in Saudi Arabia there is limited access for women to join sport clubs, jogging trails, swimming pools or exercise facilities at work. Thus, gender specific recreational facilities have to be considered when developing interventions for this population to enhance women's participation in physical activities.

Moreover, the interviews showed that few participants with low incomes, particularly those who were self employed or with young families, believed that lack of resources was a barrier because they could not afford to join clubs or buy proper equipment to exercise at home. Nonetheless, participants'

financial concerns did not take centre stage in terms of their priorities in interviews. Such concerns appeared to be a variable that was dependent on participants' ages and backgrounds. Contradictory opinions were also expressed by some participants who identified wealth as a barrier to their abilities to change their behaviours. They described how the constant availability of food and decreased levels of physical activity, due to the presence of maids and butlers, has created unhealthy lifestyles. This distinctive finding of wealth as a barrier to the adoption of healthy lifestyles among Saudis living with CVD provides new knowledge that has not been reported before and is at odds with the literature suggesting low socio-economic status as a barrier to lifestyle behaviour change among Saudis (AlQuaiz and Tayel, 2009).

Therefore, this study has identified an important factor likely to hinder cardiac patients' abilities to maintain healthy lifestyle, which resides in the influence of the physical environment where they live. Indoor walking trails and affordable exercise venues should be encouraged in Saudi Arabia to counter the negative and inhibiting effect of the hot weather, which extends for about 6 months and affects walking during that period. Equal distribution of these facilities between old and new neighbourhoods serving both genders has to be considered also to promote their accessibility to all social groups.

In summary, persistent social and cultural preferences, community values and physical environment-linked influences have compounded other individual underlying factors and made it challenging for Saudis living with CVD to maintain a healthy lifestyle even though they have expressed their willingness. Therefore, it is a distinctive finding that the sociocultural norms are a health promotion endeavour that should be taken into account in secondary CVD prevention programmes specifically designed for Saudis. This

study demonstrates that raising individuals' awareness about the need for a healthy lifestyle might not be sufficient for behavioural change unless their strongly held sociocultural beliefs and issues are addressed. Understanding the influence of the sociocultural and environmental factors that this study has unveiled for the first time is fundamental to developing culturally effective interventions and resolving the underlying structures and mechanisms that can have the potential to shape behaviour change in CVD patients in Saudi Arabia.

7.6 Factors influencing the adoption of healthy lifestyles: public policy level

Finally, the last level considered in this discussion is concerned with the policies that are likely to influence the promotion of healthy lifestyles among Saudis in general and particularly Saudis living with established CVD diagnosis. Developed within the same social ecological approach described within this thesis (McLeroy et al., 1988), the public policy level operates in close connection with the previously discussed intrapersonal, interpersonal, organisational, and community levels. Public policy level is defined as the local, state and national laws, policies and procedures that regulate or support healthy actions and practices for disease prevention, early detection, management and control (McLeroy et al., 1988). As described in the background chapter (Chapter 2), the programmes designed for secondary prevention of CVD and social intervention in Saudi Arabia are limited. Although it seems that the Ministry of Health in Saudi Arabia has attempted a decentralisation of healthcare services to regional directorates to meet the increasing pressure, it has been suggested that the functioning of the regional directorates has been adversely affected by the lack of spending authority and individual funds (AlMalki *et al.,* 2011). It is thus the responsibility of the

Ministry of Health to enforce strategies to promote healthful behaviours and reduce the risk of chronic diseases at the policy level.

7.6.1 Lack of policy regulations

Among the public policy level, two factors influenced patients' lifestyle behaviour are discussed: lack of awareness of health promotion programmes and lack of cardiac rehabilitation programmes and initiatives. Lack of awareness of health promotion programmes and initiatives was reported in the interviews with some of the participants. While few preventive strategies and healthy lifestyle campaigns and initiatives are implemented in the country (Menezes, Hussain and Madadin, 2015; Alahmed and Lobelo, 2018b), most of the participants were unaware they existed, drawing attention to inappropriate advertising of such programmes by policy makers. The respondents further claimed that most of the properly advertised health education and preventive campaigns are limited to epidemic and communicable disease such as Corona Virus and H1N1. In their opinions very little attention, or even no attention, is given to primary and secondary CVD prevention strategies by government policy makers. Participants agreed that the promotion of healthy lifestyle should be included in the national public health agenda and given priority over other epidemic diseases. It was also suggested that multisectoral collaborations in developing lifestyle promotion awareness campaigns would be an initiative resulting in effective implementation and enhanced efficiency.

Such suggestions complement the Saudi Government National Transformational Plan (NTP), as part of the Vision 20230, which emphasises on the multisectoralism in addressing NCDs prevention and control action plan 2014-2025 (United Nations, 2017a). As part of the plan, the non-health

sectors and non-governmental stakeholders are invited to play a major role in collaboration with the Ministry of Health (United Nations, 2017a). This national NCDs prevention action plan, is designed to align with the global movement to combat NCDs: the WHO Global NCD Action Plan 2013-2020 that outlines NCD-related SDG and the nine voluntary global targets for NCD prevention and control (Diem *et al.*, 2016).

Parallel to the lack of awareness campaigns was the influence of the lack of cardiac rehabilitation programmes in the country. By evaluating the global context of CVD secondary prevention, it is seen that all developed countries and many developing countries provide cardiac rehabilitation services to patients with establish cardiac illnesses (Piepoli *et al.*, 2010; Ruano-Ravina *et al.*, 2016). In Saudi Arabia however, patients are discharged from cardiac units and followed up only by cardiologists in the outpatient clinics (Alasiry, 2018; Rawas *et al.*, 2012). Although there are two cardiac rehabilitation programmes in the country (in Riyadh and Dammam) patients' enrollment is optional and not based on referral from physicians (Ministry of Health, 2014b). In the present study, it appeared that services unavailability or inaccessibility of required services, especially cardiac rehabilitation facilities, challenged the participants' abilities to maintain their healthy lifestyles during the post-cardiac event period.

Thus, participants in this study agreed that an establishment of cardiac rehabilitation facilities, (with the term itself not explicitly used, as the concept of cardiac rehabilitation was unfamiliar to all of them), could become an important tool in the promotion of healthy lifestyles among cardiac patients. Moreover, in the absence of such structured programmes, patients are left with the task of making lifestyle decisions with very little, or sometimes even no, support from healthcare providers or health systems to facilitate the

process of lifestyle change. According to the WHO, tackling the rising burden of NCDs requires a comprehensive systemic approach combining large-scale population interventions with effective individual and community health services, such as that offered through cardiac rehabilitation programmes (WHO, 2018b).

The interviews further emphasised the need for greater policy enforcement in order to establish rehabilitation programmes in large cardiac centres in the cities at least for the post hospital discharge phase of care post-cardiac events. Such an initiative could thus reduce the chances of post-discharge adverse events and re-hospitalisation among this population (Rawas *et al.*, 2012) The impact of enrolment in comprehensive cardiac rehabilitation programmes on maximising physical, psychological and social functioning as well as enabling people with cardiac diseases to lead healthy lives is very well established in the literature and is a recommended guideline enforced by organisations such as the American Heart association, European Society of Cardiology, British Heart Foundation and National Heart Foundation of Australia (Balady *et al.*, 2011; Smith *et al.*, 2011; Perk *et al.*, 2012; Piepoli *et al.*, 2016).

With regards Saudi Arabia, there are very few studies that have addressed this cardiac rehabilitation issue (Mutwalli *et al.*, 2012). A recent study conducted by Alasiry (2018) exploring patients' experiences regarding the need for cardiac rehabilitation in Saudi Arabia, highlighted patients' feelings of being disconnected and unsupported after discharge from the hospital, following their cardiac events. The study concluded there was a pressing need to design a model of cardiac rehabilitation programme that is relevant to the Saudi context, in particular to the post-hospital phase of care. This conclusion is one that this current study strongly supports. Despite the

substantial benefits of cardiac rehabilitation, including enhanced quality of life and improved survival (Leon *et al.,* 2005, Balady *et al.,* 2011, Mosca *et al.,* 2011, Smith *et al.,* 2011, Perk *et al.,* 2012, Anderson *et al.,* 2016, Schopfer and Forman, 2016), utilisation rates remain below recommendations in eligible cardiac patients and there is a significant gap between what is expected as stated by published authorities, and the reality of clinical practice worldwide (Larsen *et al.*, 2017). This gap may relate to a variety of barriers, such as a lack of awareness, negative and unfocused attitudes, and lack of expected outcomes (Leon et al., 2005, Perk et al., 2012, Anderson et al., 2016). Therefore, developing effective cardiac rehabilitation programmes in the country should take into account the overall sociocultural influences on lifestyle behaviour change and reflect gender differences in lifestyle choices; significant influencing factors which the present study has unveiled. Such developments could help provide optimal heart health for Saudi cardiac patients and enhance their adherence to prescribed treatment and lifestyle advice (Schopfer and Forman, 2016; Balady *et al.*, 2007). Further recommendations on rehabilitation services development are discussed in Chapter 8 under section (8.5.1.4).

7.7 Conclusion:

This study demonstrated that the social ecological model offers a useful framework to situate the interplay among the complex and multilevel factors that impact on Saudis' decisions to adopt and maintain healthy lifestyles during their post-cardiac event period. The synthesised findings from the study were positioned in varying degrees within the commonly used layered structure of the social ecological model, namely the intrapersonal, interpersonal, institutional, community and public policy levels (McLeroy et al., 1988).

At the intrapersonal level, the study has shown for the first time that lifestyle behaviour of Saudis seems to be highly motivated by their religious beliefs, which encourage the promotion of health and places the responsibility on the individual to maintain their given gift from God. Further, the variation in individuals' willpower and self-determination appeared to impact negatively on their abilities to sustain changes to their lifestyle after cardiac events, despite their expressed willingness to change. Health literacy levels were high among the participants; a finding which drew attention to the fact that raising awareness among patients is not sufficient to bring on behaviour change and runs counter to the literature that identified lack of knowledge and awareness about what constitute a healthy lifestyle as an important personal barrier to healthy eating and physical activity among Saudis (Mushabeb Al Farwan, 2011; Alharbi, 2016). Fear of deteriorating health status or second cardiac events was also conceptualised as a facilitator to change with possible implications of using fear-appeal as a strategy to enhance maintenance of healthy lifestyles if combined with high self-efficacy messages.

At an interpersonal level, family values and traditions appeared to have the most significant impact on patients' abilities to sustain lifestyle changes; thus providing a new knowledge for the positive influence of family members on lifestyle behaviours of Saudis living with CVD. The study also unveiled that gender norms and values are tightly interwoven with healthy lifestyle behaviours of Saudi married women; a finding that is supported in the literature (Patel, Phillips-Caesar and Boutin-Foster, 2014; Patel, Phillips-Caesar and Boutin-Foster, 2012; Iqbal, 2014).

Consideration at the institutional level revealed that insufficient healthcare services, namely poor communication, lack of lifestyle advice and lack of coordination between services were perceived as major barriers to the

adoption and maintenance of healthy lifestyles. This finding provides insights on CVD patients' experiences with healthcare providers in Saudi Arabia for the first time and suggests that healthcare should be respectful and responsive to an individual's preferences, needs and values. It also uncovers the impact of insufficient health services on Saudis decision to adopt and maintain healthy lifestyles after CVD diagnosis.

The discussion of the community factors raises very interesting findings and reveals that the established sociocultural norms and traditions are perceived as the most dominant barrier to lifestyle change and have a very strong impact on Saudis' lifestyle decisions. The study has shown that established norms associated with the value of traditional food, and the cultural limitations on physical activity engagement, shape individuals' behaviour with regard to lifestyle choices; a finding that concurs with previous studies among Saudis (Shara, 2010; Sibai *et al.*, 2010; Bakhotmah, 2012; Alissa, 2017). Furthermore, the physical environment, as a community factor exerts an additional important influence on individuals' abilities to engage in healthy behaviours. Such community factors naturally lead to consideration of policy level factors, which can be much, more encompassing and are meant to influence or control behaviour across many types of individuals. Public policy factors in the present study were conceptualised as a lack of policy regulations that should be in place to promote patients' engagement in, and maintenance of, healthy lifestyles following their cardiac events.

In summary, examining the data through the social ecological lens enabled the identification of factors that operate at a range of levels that intertwine and interact to contribute significantly to Saudis' lifestyle behaviour after CVD diagnosis. The most significant findings were identified within the interpersonal and community levels of the model, yet all levels of influence

should be taken in consideration when developing interventions for this population.

Thus, the data from this study emphasises that consideration of collectivist influences, particularly in the context of sociocultural norms, family values and religious beliefs, is key to promoting healthful lifestyles for Saudis during their post cardiac event period. Further, the most significant findings of this study have been used to conceptualise and develop a model to present factors associated with Saudis' lifestyle behaviour (figure 16), which demonstrates the study's unique contribution to new knowledge and application to practice; which is presented in Chapter 8, together with the implications and recommendation for further research.

CHAPTER 8 – Implications and Conclusions

8.1 Introduction

This final chapter summarises the key conclusions of this study in relation to the research questions posed in Chapter 5 (section 5.2.3). The conceptual model developed from the study findings and underpinned by the social ecological model of health behaviour (McLeroy et al., 1988) is presented next, bringing together the factors associated with Saudis lifestyle behaviour and outlines the study's unique contribution to new knowledge. In addition, implications for practice, research and policy are discussed and recommendations for intervention development and further research are proposed and discussed. Finally, the study limitations and concluding points are presented.

8.2 Research question 1 & 3

1. What are the perceived individual factors that promote the adoption of healthy lifestyle for Saudis after CVD diagnosis?

3. What are the perceived individual factors that hinder the adoption of healthy lifestyle for Saudis after CVD diagnosis?

This study started with the assumption that lifestyle interventions guidelines have proven to be beneficial in the secondary prevention of CVD, however, these guidelines do not achieve lifestyle changes such as the cessation of smoking, increased physical activity and better eating habits among Saudis as revealed by the present study. Adopting healthy lifestyles following cardiac events is a complex human behaviour that is influenced by many interrelating individual and contextual factors. These factors in the context of Saudis living with CVD are largely unknown and constitute a current gap in knowledge.

This research has thus explored the factors that influence the adoption and maintenance of healthy lifestyles, with a focus on a sample of subjects from two cardiac centres in Jeddah city, Saudi Arabia. Employing in-depth qualitative interviews with thirteen male and eight female patients with documented CVD diagnosis, the study revealed that lifestyle behaviour among Saudis is shaped by multiple interacting factors situated at varying levels of influence. The interviews enabled me to delve deeper into participants' perceptions, attitudes and behaviours related to lifestyle change in relation to their CVD diagnosis. Thus, I was able to explore how individuals' religious beliefs and perception on illness causation were tightly intertwined with participants' lifestyle practices and supported their positive lifestyle choices rather than interfering with them. Participants acknowledged their responsibility for protecting their own health by making lifestyle changes to stop the progression of their illness and to prevent further complications.

In addition, personal characteristics such as willpower, current health status and health literacy levels were revealed as influential individual factors that sometimes promoted or hindered participants' willingness and capacity to change their lifestyles and follow the recommended preventive strategies following their cardiac events. Another individual factor considered likely to facilitate engagement in a healthy lifestyle was the fear of illness progression or recurrent cardiac events. It can therefore be inferred that several individual factors are perceived as facilitators and/or barriers to the adoption of healthy lifestyles among Saudis living with CVD. Nevertheless, the study revealed that all factors influencing individual's behaviours are interrelated. Hence, addressing individual factors without considering the identified contextual factors is unlikely to be effective in changing patients' lifestyle behaviours. These contextual factors are discussed in the following section.

8.3 Research question 2 & 4

2. What are the perceived contextual factors that promote the adoption of healthy lifestyles for Saudis after CVD diagnosis?

4. What are the perceived contextual factors that hinder the adoption of healthy lifestyles for Saudis after CVD diagnosis?

As previously discussed in Chapter 4, this study draws on the social ecological model (McLeroy et al., 1988) which facilitated a holistic exploration of both the individual and contextual factors that impact on patients' lifestyle choices. Thus, the study revealed the influence of several social structures on participants' behaviour. Among these structures, the family environment and the pressure exerted by abiding to the socially enforced family values sometimes enabled but mostly hindered participants' abilities to maintain a healthy lifestyle. Gender norms and values exerted further pressure and were tightly interwoven with women lifestyle behaviour. Furthermore, participants considered healthcare services and the role of health professionals to be a high impact factor likely to affect their attitudes towards making lifestyle changes. Another significant factor revealed as having a tremendous impact on dietary choices and physical activity routine was the Kingdom's persistent social norms and cultural values. Finally, the influence of the physical environment was identified as a factor likely to hinder patients' abilities to maintain healthy lifestyles.

Therefore, it can be inferred that contextual factors compounded other individual underlying factors and challenged Saudis' abilities to engage and maintain healthy lifestyles after CVD diagnosis, despite their expressed willingness and capacity to do so. Such findings generated new knowledge on the individual and contextual factors that impact on lifestyle choices of Saudis living with CVD, which is a largely under-researched area. Such knowledge

builds on the existing evidence base and can be seen illustrated in the conceptual model of Figure 16 in section 8.4

8.4 Contribution to new knowledge

To my knowledge, this is the first qualitative study that has explored the barriers and facilitators to the adoption of healthy lifestyles of Saudis living with CVD. The use of qualitative design in the present study has fostered an in-depth understanding of the individual, sociocultural and environmental factors that influence the lifestyle habits of CVD patients in Saudi Arabia; the design has also helped to reveal more nuanced aspects with regard to lifestyle behaviour change. Some of the identified factors in this study have been acknowledged in previous research studies conducted in similar contexts, such as the levels of health literacy, fear of disease progression, physical symptoms and lack of will power and self- determination. These factors have been described at length in the findings (Chapter 6) and discussion (Chapter 7) of this thesis, which is presented in figure 15. However, this section emphasises the three most influential and overarching factors that shape cardiac patients' lifestyle behaviours in Saudi Arabia: the sociocultural norms, family values and religious beliefs, together with the three mediating factors: insufficient healthcare services, physical environment and policy regulations. The conceptual model is presented in figure 16.

This study has identified that knowledge of healthy lifestyle behaviour is not enough to reduce the risk of CVD or to encourage patients to engage and maintain healthy lifestyles within the Saudi context. Healthcare institutions in Saudi Arabia have invested time, money and human resources to develop guidebooks, healthy diet pamphlets, and food pyramids for NCD's patients, particularly those with diabetes miletus and CVD (Al-Dakheel, 2012). These

guidelines have increased patients' health literacy levels regarding CVD risk factors and healthy lifestyles; however, translating this knowledge into behaviour change is still a major challenge (AlQuaiz Aljoharah, 2009; Al Moraie, Lietz and Seal, 2012; Al-Zalabani, Al-Hamdan and Saeed, 2015; Alharbi, 2016). This study presents some unique and pertinent personal, sociocultural and environmental factors that are accountable for Saudis' lifestyle habits for the first time, therefore providing an original contribution to knowledge.

The research findings highlight that lifestyle choices of Saudis living with CVD are largely connected to, and informed by, their sociocultural norms, religious beliefs and family values. Cultural preferences and family values have been revealed as having a tremendous impact on patients' attitudes toward living healthy lifestyles. In addition, gender norms and values appeared to have a negative impact on Saudi women's attempts to enhance their lifestyle habits and cardiac health outcomes. The study also uncovered some challenges related to the Saudi healthcare system, which are barriers to lifestyle behaviour changes. Furthermore, the participants mentioned the influence of the physical environment, such as neighbourhood context and lack of recreational facilities, as inhibitors to physical activity behaviour.

Thus, the study revealed that individual willingness to reduce CVD risk behaviours and engage in healthy lifestyle is largely influenced by the sociocultural norms of the community where the respondents live, in which providing original contribution to knowledge in relation to Saudis living with CVD. The novel insights that this study provides can be useful for researchers and practitioners who endeavour to improve health outcomes within this population. The research findings underscore the importance of tailoring intervention strategies to be more culturally appropriate and sensitive to the

characteristics and realities of the targeted population group. This tailored focus was facilitated by applying the social ecological model (McLeroy et al., 1988) to understand the perceived barriers and facilitators to maintaining healthy lifestyles from the perspectives of Saudi cardiac patients themselves. The social ecological model is different from other models in that it is not based on a primary construct but instead focuses on the levels of influence of many factors (Joseph et al., 2014). The social ecological model emphasises that individuals are not totally responsible for their behaviour and that an inter-relational system surrounds each individual with factors that can both promote and hinder behaviour change (Stokols, 2000). Utilising the social ecological model throughout the present study facilitated the recognition that Saudis' lifestyle behaviours are too complex to be understood at just one level. The social ecological model has been used in many contexts. However, to my knowledge, the model has not been used within Saudi society for the purpose of exploring lifestyle behaviours of people living with CVD. This study expands the current knowledge by embedding the data collection and analysis within a behaviour change theory, the social ecological model, in order to help inform the future development of a tailored lifestyle change intervention based on both theory and research evidence.

To demonstrate the study's contribution to new knowledge, I have generated a new conceptual framework based on the social ecological model and informed by the data collected and subsequent overarching and mediating factors identified. Within this conceptual framework, I have identified the multilevel influences revealed from this study. The framework comprises of three main dimensions: i) religious beliefs, ii) family values, and iii) sociocultural norms, and three mediating factors: i) insufficient healthcare services, ii) physical environment, and iii) policy regulation. These factors exert significant influence on patients' lifestyle behaviour, as seen through the lens of the social ecological approach (Figure 16).

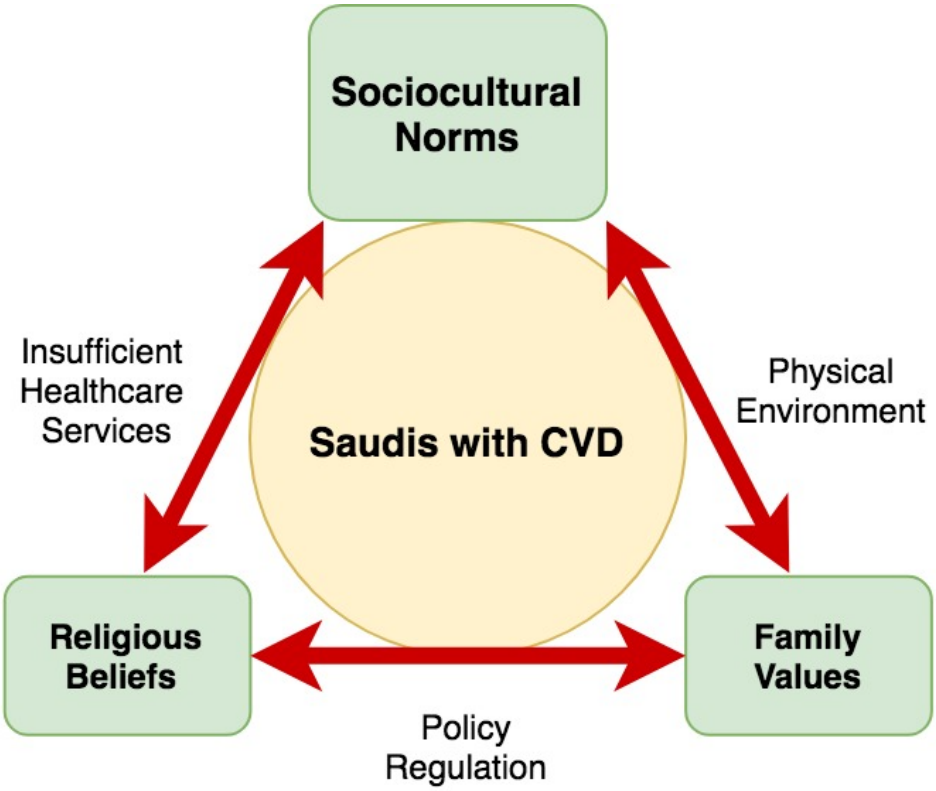

Figure 16 Factors influencing the adoption of healthy lifestyles of Saudis living with CVD: a conceptual framework

Drawing on the above conceptual framework, a relationship between the identified factors can be explained, which collectively are assumed to result in individuals either taking or not taking healthy lifestyle actions following cardiac event. It appears that individuals are making personal choices about their lifestyle behaviours while at the same time being influenced by their environment. The model acknowledges the roles of the social, physical and policy environments, and the interactions between these attributes in shaping Saudis lifestyle behaviour. The influence of the sociocultural norms dimension on Saudis' decisions to adopt healthy lifestyles appeared to be the most significant; thereby it was placed at the top of the triangle, with religious

beliefs and family values dimensions having equal influences and therefore placed next. Thereafter, a relationship between the three mediating factors and dimension is established and illustrated by double ending arrows. A further explanation of each of the conceptual model's dimensions and mediating factors is explained below.

8.4.1 Dimension one: sociocultural norms

This dimension consists of the society's established social norms and expectations. It represents the most influential factor on lifestyle change among Saudis and is considered the major finding to have emerged from this study. The study found that dietary habits of Saudis are not only associated with nutrition and energy input, but also a symbol of cultural identity and sentimental values, because a central component of Saudi culture revolves around generosity with food offering, particularly as a welcoming gesture. The social value of consuming traditional food and that behaviour's apparent negative effect on healthy dietary patterns was also highlighted. Patients believed that adhering to their cultural and social eating norms help them to maintain their social identity among their loved ones, while sacrificing their own health. They offered the insight that despite their understanding of the role of healthy diet and their willingness to change, the value of consuming traditional food and serving it to their guests impeded the sustainability of dietary changes. The study also highlighted that some of the common gender-specific traditional practices, such as wearing Abaya or the negative attitudes of men if women are seen exercising or walking alone in the street, can further limit women's opportunities to engage in physical activity.

In addition, the developed model established a connection between sociocultural norms and healthcare services. From my study, I found that

healthcare services are not sensitive to the cultural traditions and social norms of Saudis, thereby hindering the abilities of patients to engage and maintain healthy lifestyles. The evidence support the influence of cultural traditions and values in the adoption of healthy lifestyles (Netto *et al.*, 2010). Therefore, understanding these meanings in patients' contexts is very important for healthcare professionals, in order to give lifestyle advice that is culturally relevant and therefore valued by their patients. Such multiple meanings of dietary habits, along with the cultural values and established practices leads to the conclusion that the lifestyle behaviour of cardiac patients in Saudi Arabia is not only an individual matter but is also connected to the sociocultural norms and expectations. Therefore, respecting and honouring these values and beliefs can potentially make lifestyle advice easier and more effective.

Another relationship established in the conceptual model reflects the link between sociocultural norms and the physical environment where participants live. The impact of social norms and expected societal values on the accessibility and utilisation of recreational facilities was evident in this study, reflecting the importance of meeting physical environment preferences to improve the adherence to recommended preventive interventions. Therefore, a key objective for policymakers should be the provision of affordable and accessible physical activity opportunities that are sensitive to the sociocultural norms of the Saudi society.

8.4.2 Dimension two: family values

This dimension concerns the impact of family values and support, and demanding gender roles on patients' lifestyle behaviours. The study revealed that in Saudi society, family values and emotional and practical support

influences patients' lifestyle choices and decisions after cardiac events and, as such, was perceived as a motivating factor to practicing healthy living. Nonetheless, contradictory views were reported by some female patients who were constrained by the traditional gender roles, which are encouraged in certain male-dominant societies, such as Saudi Arabia. Saudi society's rules and customs appeared to limit women's lifestyle changes despite the fact that they have adequate knowledge of the need to change. Family and societal values, compounded with role responsibilities of the women, affect the family's decision-making with regard to eating habits and physical activity. It was evident from the findings how power structures within the family and social roles affected the lifestyle behaviour of women with CVD in Saudi Arabia; findings that draw particular attention to the interacting determinants of individual and social factors that reduce the capacity of women with CVD to make behaviour changes, despite their willingness to do so. Thus, interventions targeted at this population should develop strategies in the context of family values, while at the same time reducing the challenges that prevent women from achieving healthy lifestyles.

Drawing from the conceptual model, a relationship between family values, physical environment and policy regulations can be explained. This study has demonstrated the significant role of the family in encouraging healthy lifestyles for individuals and was perceived as a source of support and motivation towards healthy living and adherence to healthcare providers' recommendations. Thus lifestyle behaviours can be promoted through engaging patients' families in the process of health behaviour change. In Saudi culture, individuals, particularly women, are usually accompanied by family members when exercising, however, there aren't sufficient recreational facilities that provide family-centred activities in the country. The lack of such initiatives at the policy level constitutes a barrier to patients' abilities to engage in healthy lifestyles. Therefore, a focus on implementing more family-centred activities would have a greater impact on physical activity participation.

8.4.3 Dimension three: religious beliefs

This dimension consists of the influence of religious beliefs on lifestyle behaviours in this CVD population. As previously discussed in Chapter 2, all Saudis are Muslims and follow Islamic values and practices in all life's aspects, including health and wellbeing. Thus, perceptions about illness causation and responsibility toward health are all shaped by their religious beliefs, which consequently were found to be very influential in forming participants' lifestyle behaviour. Participants reported their religious beliefs had motivated them towards the adoption of healthy lifestyle rather than hindering them, supporting the previous findings for the connectivity between health and religion (Donnelly *et al.*, 2012; Park, Al Agili and Bartolucci, 2012; Alalawi, 2018). Therefore, this study has extended our understanding of the importance of religious beliefs on individuals' decisions to engage in healthy lifestyles among Saudis with CVD.

A relationship between religious beliefs, healthcare services and policy regulations can be further explained based on the developed conceptual model from the study's findings. Considering the significant impact religious beliefs have on patients' lifestyle behaviour, addressing this issue has to involve cooperation between patients, healthcare professionals and policy makers. Healthcare professionals should acknowledge the effect of religion in all aspects of patients' lives including healthcare decisions and health related behaviours. Lifestyle advice targeted at these patients should reflect an understanding and use of Islamic health perspectives and their impact on health behaviours. In addition, considering the provision of health education messages from a religious perspective at the policy level may help impart a powerful message to initiate and sustain positive health behaviours in a meaningful and effective manner.

8.4.4 Mediating factor one: insufficient healthcare services

The study revealed that healthcare services in Saudi Arabia create barriers to CVD patients to engage and maintain healthy lifestyles after CVD diagnosis, despite being the very institutions, which are supposed to provide them with help and support. Examples of these challenges include structural barriers limiting accessibility to services and facilities, overcrowded clinics, insufficient and therefore inefficient referral system and lack of structured programmes that support self-management post-cardiac events. All these critical issues negatively impact patients' abilities to self-manage their illnesses and engage in healthy lifestyles. Another key area in this dimension is the role of healthcare providers in facilitating the adoption of healthy lifestyles. Lack of effective communication between patients and physicians, limited lifestyle advice, and lack of follow-up support were all identified as yet more barriers to lifestyle behaviour change that need to be addressed in order to improve CVD patients' outcomes in Saudi Arabia.

8.4.5 Mediating factor two: the physical environment

The structural influences in this study were found to be significant, with lack of resources and recreational facilities, and safety issues in the neighbourhood context being important factors inhibiting physical activity. Concerns with safety due to lack of pedestrians' crossing signs and missing pavements/sidewalks were challenging for most of the participants who justified the presence of these issues by the lack of walking culture and active travel in the country. Thus, understanding the influence of the physical environment on Saudis' lifestyle behaviour is fundamental in developing intervention and resolving the underlying structural barriers that shape behaviour change among Saudis.

8.4.6 Mediating factor three: policy regulations

This dimension focuses directly on the policies that are likely to influence the promotion of healthy lifestyles among Saudis living with CVD. Individuals were disadvantaged by challenges in healthcare structures including inadequate advertising of existing preventive and health promotion services; and the lack of facilities that should provide the support needed for transitioning patients into healthy lifestyles. The respondents advocated using media and technology to promote the adoption of healthy lifestyles, rather than focusing on less important health issues. Further, the absence of services such as cardiac rehabilitation and secondary prevention programmes leaves patients to try to manage their considerable health issues by themselves, while at the same time, coping with the impediments caused by having a serious cardiac event. Thus, policy makers need to enforce strategies to promote healthy behaviours to improve patients' outcomes.

8.5 Implications and recommendations

There are some important considerations about the translation of qualitative data into evidence-based medicine and practice. Rich, subjective information provided from this study needs to be operationalised into public policy in order to bring about changes in the way CVD patients are dealt with in Saudi Arabia, to ultimately improve patient care and outcomes. The richness of a qualitative study allows theory to develop which can, in turn, inform future interventions to serve the needs of the research population (Barbour, 2000). An insight into the influential factors on lifestyle behaviour change from patients' perspectives is also invaluable in the role they play to shape responsive behaviour from health professionals based on a patient-centred ethos of care. Although qualitative research is not statistically generalisable, nor does it seek to be, it is theoretically transferable and can help in

understanding the issues for people in similar contexts, therefore adding a rich concept-driven contribution to the evidence-base (Flemming, 2007; Dohan *et al.*, 2016). While qualitative research is concerned with the micro-level of understanding, it also provides a macro-level understanding that policy makers seek in order to bring about change for a wider population (Barbour, 2000; Denzin and Lincoln, 2017). It is well established that prior to the promotion of lifestyle interventions, it is crucial in the planning stage to identify the barriers and facilitators to patients' adherence to prescribed programmes and advice. Particular attention should be given to the patients' cultural and religious values, and then the intervention can be tailored accordingly (Netto et al, 2010). This qualitative research has helped to develop an in-depth understanding of cardiac patients' experience as they attempted to transition into healthy lifestyles that should be at the heart of public policy in Saudi Arabia. Part of the transition of the evidence from this study into actual changes in practice and policy will necessarily involve further research and culturally sensitive interventions developed, piloted and evaluated using randomised controlled trials (Craig *et al.*, 2008).

8.5.1 Implications for practice

The swiftly changing trends of disease from infectious to NCDs, along with the huge burden of CVD risk in Saudi Arabia bring challenges to patients, families and perhaps most of all, the healthcare services (Ahmed *et al.*, 2017). Accordingly, to reduce these risks, healthcare authorities should move towards prevention rather than being curative (Bansilal, Castellano and Fuster, 2015). The findings of this study emphasised that all the interventions focused on CVD patients must recognise that people live in social, political and ecological systems that shape behaviour and control access to the resources that they need to maintain good health. Even if individual behavioural changes are made, these alone are unlikely to result in improved

health and quality of life without an environment that enables the sustained implementation of those changes (Edwards and Barker, 2014). Thus, understanding the effect of personal, social, cultural and environmental determinants of lifestyle that this study had revealed is essential in creating viable health-promoting programmes. Thus this section, which is based on the study's findings, offers suggestions and strategies for healthcare policymakers to develop culturally sensitive programmes aimed at promoting cardiovascular health.

This goal will be attempted by encouraging patients' participation in healthy lifestyles as a secondary prevention strategy for CVD at three levels; the individual, community, and policy. Within this initiative there will be a specific focus on nurses' roles in promoting healthy lifestyles at each level. Nurse-provided or nurse-coordinated care management programmes using an integrated or multifactorial approach have been highly effective in reducing CVD morbidity and mortality of high-risk persons (Bdeir, Al Mallah and Conboy, 2014; Rega *et al.*, 2014; Odeh, Alkhateeb and Bdeir, 2017). Given that patients' perspective might affect their health management process, nurses, who are the primary caregivers in different healthcare settings, are competent to work with the patients with respect to their experiences, values, beliefs, knowledge, preferences, and self-management abilities in planning of care (Crisp and Iro, 2018). With the enormous developments in nursing over the past decades, along with the extended roles and degree level education, nurses are well prepared and well-suited to meet the changing health needs, particularly for NCDs, to deliver increased levels of health promotion and disease prevention, to develop primary care, and to provide support and supervision for community health workers (Crisp, Brownie and Refsum, 2018).

Thus, by empowering nurses and investing in developing their workforce, they can play a major role in spreading UHC rapidly, cost effectively and to a high level quality (Crisp, Brownie and Refsum, 2018). Table 4 provides a list of recommendations at each level to promote the adoption healthy lifestyles informed by the findings of this study.

Table 4 List of recommendation to promote healthy lifestyles among Saudis living with CVD

Level of influence	Recommendations
Individual level	• Implementing religious sensitive strategies to promote healthy lifestyles. • Involving religious and community leaders to endorse participations in healthy lifestyles. • Establishing clinical religious advisers in medical institutions.
Community level	• Establishing a family-centered model of care. • Providing culturally competent care by addressing cultural values and societal norms related to Saudis lifestyle behaviours. • Developing interventions that address cultural barriers. • Implementing participatory interventions in lifestyle behaviours, such as family centered physical activities.
Public policy level	• Promoting accessible physical activity opportunities by introducing walking programmes. • Developing cardiac rehabilitation programmes • Promoting cardiovascular health in early life

8.5.1.1 Promotion of healthy lifestyles at the individual level

Secondary prevention health strategies suggested at this individual level are sensitive to individual's health beliefs and personal characteristics that shape their health behaviour. As revealed by the findings of the study, religious beliefs and Islamic teachings have a great impact on motivating individuals to adopt and maintain healthy lifestyles. Nonetheless, it appears that patients' religious beliefs were not discussed by their healthcare providers. A study conducted by Al-Yousefi (2012) in Saudi Arabia with the aim of assessing physicians' beliefs regarding discussing their patients' religious beliefs in clinical practice. The study revealed that religious issues were not discussed by physicians, despite the majority of the study participants considering that the influence of religion on health was generally positive (Al-Yousefi, 2012).

Thus, this present study proposes that religious sensitive strategies can be used to promote healthy lifestyles such as discussing the influence of religious beliefs on health related behaviour when delivering medical care. According to Al-qahtani (2015), healthcare professionals should acknowledge the effect of religion in all aspects of patients' lives including healthcare decisions and health related behaviours. Persuasive healthy lifestyle messages targeted at patients should reflect an understanding and use of Islamic health perspectives and their impact on health behaviours. Such messages should also contain deeper insights that demonstrate the connections between health and religion by including verses from Islamic sources such as quoting verses from Quran and Sunnah. In addition, the provision of religious teaching during Friday sermons for communicating public health messages, in order to motivate people to adopt healthy lifestyles should be considered (King *et al.*, 2017; Kahan, 2018).

Another consideration of religious beliefs in secondary prevention strategies is the involvement of religious and community leaders to endorse participations in healthy lifestyles. Muslim religious leaders or (Imams) play key roles in framing concepts of health and disease and encouraging healthy lifestyles outside of the healthcare system (King *et al.*, 2017). Although the involvement of clinical religious advisers in medical institutions has been suggested by Al-Yousefi (2012) as a promising solution, as far as this study aware, it has not yet been applied to any medical institutions throughout the Kingdom. This could be explained by the work that has to been done to improve the capacity of healthcare professionals to appropriately address religious issues through training. Therefore, in light of the influence religious beliefs have on patients' lifestyle choices, this study supports the notion of establishing clinical religious advisers in order to integrate religious beliefs in secondary prevention of CVD initiatives and wider contexts, with the overall aim of achieving better health-related outcomes.

8.5.1.2 Promotion of healthy lifestyles at the community level

Health promotion strategies at this level are sensitive to family values and established cultural and societal norms. Secondary prevention strategies aimed at the promotion of healthy lifestyle behaviours are common across the global spectrum, with many shared aims and endpoints. In particular, the evidence support the influence of cultural traditions and values in the adoption of healthy lifestyles (Netto *et al.*, 2010). The findings of this study support the need for developing health promotion programmes that are sensitive to the cultural traditions of Saudis. The sharing of ideas and practices across cultures in public health interventions appears to be the most logical solution to reducing mortality and morbidity from preventable diseases across societies (Netto *et al.*, 2010; Thorndike, Riis and Levy, 2016).

This study has demonstrated the significant role of the family in encouraging healthy lifestyles for individuals and was perceived as a source of support and motivation towards healthy living and adherence to healthcare providers' recommendations. Thus, current practice can be enhanced through partnerships between healthcare organisations and patients' families. Because of the collectivist nature of families in Saudi Arabia, patients are usually accompanied to the clinical setting by a family member, and those family members can be included in any health education that the patient receives. Nurses can work very closely with all family members and address any concerns related to the family's cultural norms and values that influence the patient's lifestyle. Since nurses in community settings acknowledge the importance of continuity of care to sustain changes, it is encouraged and advisable that family members are involved in the patient's education sessions, as well as having an opportunity to explore solutions that make lifestyle changes possible (Gregory, Bostock and Backett-Milburn, 2006; Rosland, Heisler and Piette, 2012; Baig *et al.*, 2015; Brown *et al.*, 2016).

A move from the conventional medical approach toward family-centered model of care that enables a greater integration of family care into the Saudi healthcare system has been suggested in the literature (Saleh Al Mutair *et al.*, 2014). It has been argued that the family presence and support may affect the response of patients undergoing hospitalisation or medical procedure (Kerr, 1988). In addition, family members of CVD patients are an 'at-risk' population who can benefit from lifestyle intervention in order to potentially decrease their own CVD risk levels. In view of the findings that indicate family involvement can have negative as well as positive effects, healthcare providers could determine if involved members, such as husbands, are being helpful to the patient and provide health education and psychological education if needed; nurses and social workers could easily fill this role.

Along with family involvement, healthcare providers can provide culturally competent care to Saudi patients by addressing cultural values and societal norms related to their lifestyle behaviours. For instance, providing heart healthy dietary advice that adheres to the patient's own dietary pattern and food combination should increase their willingness to consider any suggested changes. The development of culturally sensitive dietary guidelines to help prevent and control the main nutrition-related diseases in Saudi Arabia, "the Healthy Food Palm" (Al-Dakheel, 2012) is a promising initiative that take into consideration Saudis' specific and most valued food preferences. It would be beneficial to patients if healthcare providers offered nutritional education and teaching about heart-healthy dietary choices, incorporating information about using the Healthy Food Palm initiative.

Additionally, to overcome the identified cultural considerations, which negatively influence participation in exercise and physical activity, more simple interventions that address barriers could be implemented. For example, traditional dress code should include the design of sportswear for women that is culturally appropriate, particularly running and cycling attire. This could help ease the challenges to engage in physical activity that are posed on women due to Abaya limitations, while at the same time preserving the strongly held cultural and social norms. Additionally, in Saudi Arabia, women are commonly accompanied by a male relative when walking or exercising outdoors; therefore it is possible that a focus on more family-centred activities would have a greater impact on participation rates. The outcome of implementing a large number of inclusive participatory interventions in lifestyle behaviours, such as family focused physical activities, is twofold, leading to empowered societal groups with associated benefits in health status (Brown, Schiff and van Sluijs, 2015; Brown *et al.*, 2016).

8.5.1.3 Promotion of healthy lifestyles at the policy level

Much recent debate about public health policy and the reduction of health inequalities has concentrated on the merits of promoting informed individual choices, as against those of interventions, which have a structural impact. That is, interventions that affect the entire community are most likely to be of particular benefit to people living in circumstances that are unsupportive of voluntary behavioural change (Netto *et al.*, 2010). This present study has provided a broader understanding of the contextual factors that influence lifestyle behaviours of Saudis living with CVD for the first time. Physical and social aspects of the surrounding environments contribute to variations in the adoption of healthy lifestyle behaviours. Implementing interventions targeted at reducing the CVD burden through healthy lifestyle promotion is a public health priority that must be conceptualised as a function of multiple individual, interpersonal, organisational, community and public policy factors. Because sociocultural norms and values are deeply embedded within the Saudi community, changing them can be challenging. However, changes to sectors and settings can have a powerful effect on social and cultural norms over time and can align with the recommended lifestyle guidelines (Netto *et al.*, 2010).

Health promotion strategies at this level are concerned with informing policies to promote the adoption of healthy lifestyles, based on factors identified from the present study. With regards to physical environment barriers identified in this study, promoting affordable and accessible physical activity opportunities by introducing walking programmes that take place in a number of large air-conditioned shopping malls within the large cities can address the twin barriers of limited recreational facilities and the hot weather, particularly during the extreme temperatures in summer months. Policy makers can also form partnerships with local communities and healthcare agencies in several ways. They can work with communities to provide public green spaces with paths for

walking and enough security to help individuals feel safe while participating exercise activities. Besides, investment in nursing, as well as effective legislation, education and employment practices for nurses is needed to tackle the growth of NCDs and achieve a rapid, cost-effective expansion of high-quality UHC (Crisp and Iro, 2018; (Crisp, Brownie and Refsum, 2018). This will also help to realise the Kingdom 2030 Vision target of advancing the nursing profession and improving healthcare delivery in Saudi Arabia (Al-Dossary, 2018).

The study further proposes to put in place policies to develop cardiac rehabilitation programmes across the country, as well as suggesting the promotion of cardiovascular health in early life, which is discussed in the following sections.

8.5.1.4 Development of cardiac rehabilitation

Despite the rise in the burden of CVD in Saudi Arabia, the national preventive health system and screening programs have trailed behind (Ahmed *et al.*, 2017). Therefore, it is of the utmost importance to begin implementing CVD secondary preventative measures within these countries to stop the continued increase in individuals living with CVD. As mentioned earlier, the findings of this study highlight challenges with the Saudi healthcare system, which can inhibit patients' abilities to engage and maintain a healthy lifestyle after hospital discharge. In CVD patients, discharge from hospital to home is a transition phase which is characterised by errors resulting from the discontinuity and fragmentation of care and which places patients at high risk of post-discharge adverse events and re-hospitalisation (Snowden and Marland, 2013). After discharge from cardiac units in Saudi Arabia, patients are followed up only by a cardiologist in an outpatient clinic (Rawas et al.,

2012). A variety of other obstacles were identified by the participants indicating that access to and continuity of care remain important issues for many individuals. By having access to such professional services they would not have to seek advice, care and screening on their own initiative. To achieve concordance with healthcare programmes, it is very important to understand patients' lives, individuality, culture and unique circumstances when establishing a model of care for a group of people with special conditions, such as CVD (Snowden and Marland, 2013).

Based on the findings of this study, cultural and gender specific models for cardiac rehabilitation and secondary prevention could be developed for Saudi Arabia, similar to those recommended by the American Heart Association (AHA) (Mosca, et al., 2011) and European Society of Cardiology (ESC) (Perk et al., 2012). Such guidelines would assist with the development of cardiac rehabilitation so that programmes are tailored to the key risk factors for Saudis (smoking, obesity and physical inactivity) and which are sensitive to Saudi culture and patients' needs. Ensuring health interventions are delivered within the context of both gender and culture is important when addressing health disparities and promoting health services equity (Netto *et al.*, 2010; Kim *et al.*, 2016).

Further, the use of technology and the concept of virtual cardiac rehabilitation in certain hard-to-reach populations, like those living in rural communities, could be the way forward. However, such an initiative would be very population specific and informed by a patient's engagement and familiarity with technology (Lear and Banner-Lukaris, 2014; Banner *et al.*, 2017). Such programmes can provide advice on exercise progression and appropriate activity levels following a comprehensive assessment, in addition to online health education programmes at a time convenient for work and life

commitments. Virtual programmes would facilitate integration and pathways into mainstream facilities within the community, addressing the demand for space within acute hospitals for rehabilitation programme provision (Lear and Banner-Lukaris, 2014; Banner *et al.*, 2017).

However, this delivery mode requires fairly technology-familiar and motivated individuals in order to be successful in achieving the goals of cardiac rehabilitation in relation to secondary prevention outcomes (NACR, 2012), so it may be limited to younger populations. Therefore, home-based cardiac rehabilitation can be a good alternative to the virtual or hospital based cardiac rehabilitation options. In a randomised controlled trial study, Mutwalli et al., (2012) compared the effectiveness of home-based cardiac rehabilitation on post CABG patients to standard hospital care in Jeddah, Saudi Arabia. The findings revealed improvement in patients' health-related quality of life and risk factor profiles among the home-based cardiac rehabilitation group (Mutwalli *et al.*, 2012). Therefore, development of either home-based cardiac rehabilitation or virtual cardiac rehabilitation for appropriate groups remains a possible alternative to traditional hospital-based cardiac rehabilitation programmes.

8.5.1.5 Cardiovascular health promotion in early life

There is strong evidence that the acquisition and accumulation of cardiovascular risks begin early in life (Fuster, 2010b; Institute of Medicine, 2010; Campbell *et al.*, 2014; Peñalvo *et al.*, 2015). Unhealthy lifestyle practices such as the intake of high-calorie and high-fat foods, tobacco use, and physical inactivity in childhood and adolescence increase the risk of developing CVD. Therefore, beginning cardiovascular health promotion during early childhood is of great value (Campbell et al., 2014). Maternal and child

health programmes in primary health units in Saudi Arabia should not only focus on tertiary childhood outcomes, but also offer services that promote healthful behaviours and reduced risk of developing NCDs. The Saudi Arabian Ministries of Health and Education should be encouraged to incorporate healthy food choices for students that are low-in-fat and saturated fat for students; thereby promoting healthy low fat eating behaviours from an early age (McKenna, 2010).

Government initiatives are also needed to encourage laws necessitating easily accessible calorie information at food outlets so that individuals can be more informed and can make better nutrient selections (Goodman *et al.*, 2018). Promotion of healthy eating through inclusion of nutrition workshop/classes in the curriculum could be an important strategy. Promotion of physical activity curricula in schools should also be a priority to promote physically active behaviour and thereby reduce the burden of CVD (Zahnd *et al.*, 2017). This investment in the younger generations could help to encourage and support the adoption and maintenance of healthy lifestyle habits into later adult life and control the current widespread prevalence of CVD. Many nations have already issued bans on junk foods at schools and have promoted proper physical activity curricula at schools. Such stringent beneficial action is also required in a country like Saudi Arabia, where NCDs are growing at alarming rates. The planning, development and implementation of this promotion would require the coordinated efforts of the various government ministries in Saudi Arabia (i.e., Health, Education, Planning and Economy, and Social Affairs).

In summary, application of the results of this study would be useful for cardiologists, cardiac nurses, community nurses, health educators, and other healthcare professionals involved in promoting healthy lifestyle behaviours

among CVD patients. Findings from the study show that raising awareness of the importance of healthy lifestyle for the secondary prevention of CVD has reached the minds of the participants. However, the great majority of them are not engaged in healthy lifestyles due to multiple individual, societal and environmental factors. Therefore, the implementation of contextually based cardiovascular preventive strategies that address the identified barriers to the adoption of healthy lifestyles is warranted as a priority. By looking further ahead and adopting strategies from countries with similar sets of cultural values, where there is evidence of emerging successful interventions, greater success may be achieved in public health interventions. For example, the Supreme Council for Health (SCH) in Qatar, in association with key stakeholders, initiated a number of population-wide strategies to tackle low physical activity levels, particularly in previously underrepresented groups (Milligan, 2014). The campaigns focused on the promotion of family-centred physical activity interventions, education through media modalities and use of technology, with mobile phone apps that provide healthy lifestyle advice and support (Milligan, 2014).

In addition, the development of a nurse-directed, physician-supervised cardiovascular disease management programme for heart failure (HF) patients at King Abdulaziz Cardiac Centre in Riyadh is a promising initiative. It has provided the first evidence to support the hypothesis that a nurse-led HF care reduces all cause mortality in Saudi Arabia (Bdeir, Al Mallah and Conboy, 2014; Odeh, Alkhateeb and Bdeir, 2017), and add to the body of knowledge indicating the benefits of nurse-led CVD programmes. Such programmes can be replicated with more contextual involvement in other areas of Saudi Arabia.

8.6 Implications for research

The current body of research investigating the factors that influence health behaviour change or which has evaluated the effectiveness of health behaviour change interventions among Saudis is sparse. There is thus a need for more coherent, adequately funded public health research focusing on Saudis or the Gulf countries more widely. The findings identified in this research could provide the basis for future research studies related to lifestyle behaviour. In addition, a number of areas have been identified in this thesis, suggesting directions for future research and tested interventions

8.6.1 Further research with wider population and across other regions in Saudi Arabia

This study was based on a small group of patients being treated at two cardiac centres in Jeddah, Saudi Arabia. However, the methods used provided a rich insight into the subjective lifestyle change experience of people living with CVD. Combined with existing research and theory, this kind of rich qualitative data can make an important contribution to academic knowledge (Barbour, 2000; Olson, Young and Schultz, 2016). Theoretical saturation of interview data also implied that no new issues would emerge, suggesting that the main themes were covered. Nonetheless, there is a scope for further complementary studies involving a larger and more diverse group of patients, informed by the findings from this study. Perhaps nationwide coverage would be appropriate in order to assess the frequency of some of the key findings and confirm their transferability. In addition, further research to identify the current state of CVD secondary prevention in Saudi Arabia could be recommended and may identify solutions for promoting effective secondary prevention as well as developing strategies to overcome the identified barriers to managing the several risk factors associated with CVD.

8.6.2 Further multidimensional research

This study has approached CVD patients' lifestyle behaviour from the perspective of a five level framework based on the social ecological approach (Chapter 7, sections 7.2 to 7.6), namely the intrapersonal, interpersonal, institutional, community and policy levels. While the focus has been predominantly on three levels of this framework, further research could be directed towards exploring the institutional and public policy levels in more detail. In addition, exploring healthcare providers' and policy makers' views about promoting healthy lifestyles among this population can provide more details and new insights which may find ways to mitigate the risk of CVD.

The findings from this study have illuminated some of the important issues related to Saudis living with CVD, particularly concerning their lifestyle behaviours. However, the findings have also raised some serious concerns regarding weaknesses in the existing prevention and intervention strategies for this particular population. Further research is needed to determine the prevalence of the identified factors from the current study, perhaps using quantitative approaches to produce more generalisable dataset, so that interventions can be configured accordingly. The findings of this study could also be considered in the design of comparative studies on people in other settings and from other countries in the Middle East. Such research could identify whether these populations have similar perceptions regarding the barriers and facilitators to lifestyle behaviour change, to the ones identified in the current study.

Longitudinal cohort studies are also recommended to see how lifestyle behaviour changes over time. Future lifestyle change interventions for CVD might include a longitudinal design to capture additional data about how the

target population attains and then maintains CVD risk reduction over a greater period of time.

8.7 Limitations of the study

This study, despite its attempt to accomplish its aim and objectives by using the most appropriate methods and methodological approach, has certain limitations. Firstly, the study was conducted in a specific geographic location, Jeddah, where patients with diverse cultures and traditions receive cardiovascular treatment; hence the findings may not be applicable to the entire CVD population in Saudi Arabia. However, the maximum variation sampling technique employed in this study increased the likelihood that findings reflect different perspectives. Using a larger sample and perhaps a mixed methodology in future research can broaden the scope and include informants with diverse cultures and traditions than took part in the current study.

Secondly, even though a native Saudi Arabian conducted all of the interviews, there is still a possibility that certain expressions or phrases in Arabic were not given the exact same meaning in English during translation. Participants were from different ethnic backgrounds and used phrases or idioms from their own languages. Therefore, the meanings attributed to these experiences might have changed through the translation process. This potential impediment was lessened by asking participants to provide further explanation of specific terms they used in some cases, particularly the rural participants. I also tried to verify meanings with appropriate translators, however, some concepts may have changed. Thirdly, some participants were hesitant to be interviewed alone and asserted on having their family members present in the room. As a result, three participants were interviewed in the presence of their children

and/or spouses. The presence of the family members in these cases may have concealed some of the reality. Credibility and trustworthiness were enhanced by carefully following the applied method of data analysis and by ongoing research team meetings to discuss the emerging themes and interpretations.

Finally, the hospital staff recruited patients for the research, with the latter cohort being comfortable with giving verbal consent to participate. However, when the patients were asked to sign the consent form, very few refused to participate. In their minds signing the consent could somehow be used against them, as it was perceived as a legal document. This kind of contextual perception also hampered the collection of data from the interviews.

8.8 Concluding points

Established secondary prevention guidelines have proven to be beneficial in the secondary prevention of CVD, however, these guidelines do not achieve lifestyle changes such as the cessation of smoking, increased physical activity or better eating habits. Adopting a healthy lifestyle is a complex human behaviour that is influenced by many interrelating individual and contextual factors. Empirical research has shown that imparting information and raising awareness may not be sufficient to change individuals' behaviours (Kelly and Barker, 2016); there are other reasons existing for the persistence of such behvaiour. This complexity supports a need to create a better and deeper understanding of the determinants of behaviour change that are relevant to Saudis living with a diagnosis of CVD. To address this gap in research, this qualitative study has explored the factors that facilitate or hinder Saudis' abilities to adopt and maintain a healthy lifestyle after their CVD diagnosis. The use of in-depth interviews provided important insights into the individual,

sociocultural and environmental challenges that they face to adjust their lifestyles and accommodate the change in their health status. The interviews also yielded a rich perspective on the subjective experience shared by participants and highlighted their most important concerns and unmet needs.

The findings of this thesis provided novel and new insights into Saudis' lifestyle behaviour after CVD diagnosis. The issues that arose from understanding these factors are fundamental to developing effective interventions for the secondary prevention of CVD among Saudis. Current models of health behvaiour or health practices does not appropriately place the sociocultural contexts as central construct. This conclusion implies that healthcare providers need not only to educate patients on changing their lifestyles, but also to understand the challenges related to the complex sociocultural norms and structural forces that make it difficult for CVD patients to change their lifestyle behaviour and habits. With such an understanding, they will have the capacity to work within a healthcare system and enact healthy recommendations, whereby appropriate secondary prevention interventions and positive outcomes are more likely to follow. Major reforms in structural policies, together with the implementation, are needed to reduce the burden of chronic diseases such as CVD that require behaviour change by those patients so affected.

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Appendices

Appendix 1 Summaries and characteristics of the studies selected in the review

Author(s)	Title	Country	Methods	Sample size	Participants	Aim	Data analysis
(Bergman and Berterö, 2001).	You can do it if you set your mind to it: a qualitative study of patients with coronary artery disease.	Sweden	Qualitative interview study	(n=8)	Participants had to have coronary artery disease, be registered at the County Hospital.	To gain increased knowledge and understanding of what it means to be afflicted with coronary artery disease (CAD) and how it affects the life/ lifestyle of the individual.	Hermeneutic analysis methods
Eyler et al. (2002)	Environmental policy, and cultural factors related to physical activity in a diverse sample of women: The Women's Cardiovascular Health Network Project.	USA	Qualitative study using focus groups	42 focus groups	White, African American, Latina, and American Indian women aged 20-50 years	To identify environmental, policy, and cultural barriers to physical activity in women.	Data were analysed with QSR NUD*IST qualitative software.
Kärner (2005)	Incentives for lifestyle changes in patients with coronary heart disease	Sweden	Phenomenological qualitative design	(n=k1.13)	Patients below 70 years of age (84 men and 29 women) were interviewed within 6 weeks of a cardiac event and again after 1 year.	To explore how patients in the rehabilitation phase of coronary heart disease experience facilitating and constraining factors related to lifestyle changes of importance for wellbeing and prognosis.	Phenomenological data analysis

Condon and McCarthy, (2006)	Lifestyle changes following acute myocardial infarction: Patients perspectives.	Ireland	Descriptive qualitative study	(n=10)	Participants over 18 years, who had a diagnosis of a first MI and completed phase 1 CR in the hospital were interviewed 6 weeks following discharge	To explore patients' perspectives of making lifestyle changes following AMI.	Thematic analysis was used to analyse the interviews
Goldsmith et al. (2006)	Dilemmas of talking about lifestyle changes among couples coping with a cardiac event.	USA	Qualitative interview study.	(n=41; 25 patients and 16 partners)	Participants ranged in age from 37 to 81; average age was 66 for patients and 63 for partners. Education and occupation were varied. All participants were married except one who was involved in a committed romantic partnership.	To explore dilemmas that may arise when couples talk about lifestyle changes following one person's MI or CABG.	Open coding and constant compariso n methods of grounded theory were used to analyse the interview data.
Gregory et al., (2006)	Recovering from a heart attack: a qualitative study into lay experiences and the struggle to make lifestyle changes.	Scotland	Qualitative study utilising Focus groups and interviews	(n=53)	35 men and 18 women who were discharged from hospital two/three years previously. Participants were recruited via a coronary care unit and patients' GPs.	To identify views and experiences of people recovering from myocardial infarction, specifically barriers to, and facilitators of, following advice about lifestyle change and maintenance.	Constant compariso n methods of grounded theory were used to analyse the data.

King et al. (2007)	First Nations people's challenge in managing coronary artery disease risk.	Canada	Grounded theory	(n=22)	Participants included First Nations who were living in the reserve communities as well as those who were living off reserve. Participants with varied ages, education and income levels, and time from CAD diagnosis were recruited.	To describe and explain how ethno-cultural affiliation and gender influence the process that First Nations people underwent when making lifestyle changes related to their coronary artery disease (CAD) risk.	Constant comparative analysis used in grounded theory.
Darr et al., (2008)	Causal attributions, lifestyle change and coronary heart disease: illness beliefs of patients of South Asian and European origin living in the UK	United Kingdom	Qualitative study utilising in-depth interviews	(n= 65)	20 Pakistani-Muslim, 13 Indian-Hindu, 12 Indian-Sikh, and 20 Europeans admitted to one of three UK sites within the previous year with unstable angina or MI, or to undergo CABG	To examine and compare the illness beliefs of South Asian and European patients with coronary heart disease (CHD) about causal attributions and lifestyle change.	The study used framework analysis
(Folta *et al.*, 2008)	Factors Related to Cardiovascular Disease Risk Reduction in Midlife and Older Women: A Qualitative Study	USA	Qualitative study using focus groups and interviews.	focus groups (n=38) Interviews (n=25)	Focus groups were conducted with white women aged 40 years or older in Kansas and Arkansas. Cooperative State Research, Education, and Extension Service agents in those states	To understand knowledge and awareness about CVD in women, perceived threat of CVD, barriers to heart-healthy eating and physical activity, and intervention strategies for behaviour	Data were coded in 2 steps: key phrases were coded into a framework that was based on the questioning structure, and emerging themes were

					were recruited for interviews.	change.	added to the framework and coded.
Stafford (2008)	Illness beliefs about heart disease and adherence to secondary prevention regimens.	Australia	Prospective quantitative study	(n=193)	Participants were recruited over 11 months from a major hospital in Australia. All English speaking, who resided permanently in Australia and were hospitalized for PTCA, MI, or CABG during this time were eligible for participation.	To investigate illness beliefs of recently hospitalized patients with coronary artery disease (CAD) and the prospective association between these beliefs and adherence to secondary prevention behaviors. Causal attributions of CAD and their concordance with actual patient risk profiles were also examined.	Data were analyzed using SPSS
(Gettleman and Winkleby, 2000)	Living with heart disease after angioplasty: A qualitative study of patients who have been successful or unsuccessful in multiple behavior change.	USA	Qualitative interview study	(n=61)	Half of the population sample was female, as well as one-third African-American, one-third Latino, and one-third Caucasian.	To document values, attitudes, and beliefs that influence behavior change among a diverse group of patients post-angioplasty.	Grounded theory methods were used to analyse data

Speechly et al., (2010)	Patient and general practitioner attitudes to healthy lifestyle behaviours and medication following coronary heart disease: an exploratory study.	Australia	Exploratory qualitative study	(n=21; 8 GPs and 13 CHD patients	English-speaking CHD patients aged 40–70 years who had consulted their GPs in the past year.	To explore patients' and general practitioners' (GPs') perceptions about the effectiveness of healthy behaviours and medications for the prevention of further cardiovascular disease.	
(Donnelly *et al.*, 2012)	Qatari women living with cardiovascular diseases, challenges and opportunities to engage in healthy lifestyles	Qatar	Qualitative study using individual in-depth interviews	(n= 50)	Arabic women 30 years of age and over, who had been diagnosed with CVD and lives in Qatar.	To investigate ways to increase participation in physical activity, and to promote a healthy diet, and non-smoking behaviour in Qatari women.	Data analysis involved the development of themes and concepts, which were compared within and across transcripts.
Murray et al., (2012)	Individual influences on lifestyle change to reduce vascular risk: a qualitative literature review.	___	Qualitative literature review	(n=22)	_____	To explore the factors influencing maintenance of lifestyle behaviour change in individuals with high cardiovascular risk	_____

Rogerson et al., (2012)	"I don't have the heart": a qualitative study of barriers to and facilitators of physical activity for people with coronary heart disease and depressive symptoms.	Australia	Qualitative interviews study	(n=15)	12 males; 3 females who ranged in age from 47 – 75 years (M= 63.6 years) were recruited into the study. All participants had been hospitalised for a cardiac event within the past 12 months triggering referral to a CR programme.	To explore the barriers to and facilitators of physical activity for cardiac patients with depressive symptoms	An inductive approach to content analysis was used to allow the themes to emerge from the quote
Cole et al., (2013)	Do practitioners and friends support patients with coronary heart disease in lifestyle change? a qualitative study	United Kingdom	Qualitative interview	(n=45)	Individuals, with CHD, were selected to include those who succeeded in improving PA levels and dietary fibre intake and those who did not.	To explore patients' perceptions of factors affecting lifestyle change within a trial of this intervention (the SPHERE Study	Interviews were analysed using a thematic framework and the constant comparative method, facilitated by using NVivo
Murray et al., (2013)	A qualitative synthesis of factors influencing maintenance of lifestyle behaviour change in individuals with high cardiovascular risk.	_____	Qualitative synthesis study	(n=22)	Participants were adults (≥18 years) who: were previously or currently obese; experienced angina, MI or TIA or; were living with CHD, COPD, HTN, hyperlipidemia, metabolic syndrome or type II diabetes.	To clarify the main patient perceived factors thought to influence maintenance of changed healthy lifestyles. In individuals with high CV risk	The principles of content synthesis and thematic analysis were used to extract reported factors.

Savage et al., (2013)	Fatalism and short-termism as cultural barriers to cardiac rehabilitation among underprivileged men	Canada	Qualitative interviews	(n=20)	Participants were French speaking men aged 40 to 65 years living in underprivileged neighbourhoods in Québec and had experienced a cardiac event requiring medical intervention and hospitalisation.	To understand the social mechanisms underpinning the lifestyles and health practices of underprivileged men who had suffered a cardiovascular incident requiring hospitalisation.	The interviews were transcribed verbatim and analysed using proprietary data management software (QSR NVivo 8).
Dunn et al., (2014)	Identifying similar and different factors effecting long-term cardiac exercise rehabilitation behavior modification between New Zealand and the United Kingdom.	United Kingdom and New Zealand	Retrospective qualitative study	UK (n=22) NZ (n=21)	Participants had previously been discharged from CR for 6 to 12+ months within the UK and NZ	To identify the similar and different influences in CR of the United Kingdom (UK) and New Zealand (NZ)	Discussions were digitally recorded, transcribed then thematically Analysed
Iqbal (2014)	Promoting Dietary Change and Positive Food Choices for Poor People with Low Income Who Experience Cardiovascular Disease in Pakistan.	Pakistan	Qualitative interview study	(n=24)	Participants interviewed were 30-70 years of age and had a CVD diagnosis (self - reported), with low SES and have attended any kind of CR programme or received teaching related to secondary prevention.	To explore the barriers to and facilitators of dietary intake of CVD people with low SES status who received education at two cardiac facilities in Karachi, Pakistan	The study employed the methodological genre of interpretive description. ATLAS.ti qualitative data analysis software was used to analyse the participants' interview

							data
(Junehag, Asplund and Svedlund, 2014)	Perceptions of illness, lifestyle and support after an acute myocardial infarction.	Sweden	Qualitative descriptive design.	(n=20)	Men and women (ages 46-73) were interviewed 1 year after their first AMI, and 11 had been offered contact with mentors who had had an AMI.	To describe individual perceptions of cardiac patients lifestyle and support, 1 year after an AMI, with or without mentorship.	Content analysis was used to analyse the data.
Patel et al., (2014)	Attitudes and Beliefs Regarding Cardiovascular Risk Factors Among Bangladeshi Immigrants in the USA.	USA	Qualitative study using individual in-depth interviews.	(n= 55)	Participants were recruited from a federally qualified health center in New York City. They were 18 years of age and older, and able to speak and understand English.	To explore attitudes towards and difficulties with modifying CVD related behaviors among a Bangladeshi cohort living in the US.	The semi-structured interviews were analyzed using grounded theory methods
(Ruston and Clayton, 2002)	An exploratory mixed methods analysis of adherence predictors following acute coronary syndrome.	USA	Exploratory mixed methods study	(n=22)	Individuals who were admitted for ACS and had suboptimal pre-ACS adherence to physical activity, heart-healthy diet, and/or medications, defined by a Medical Outcomes Study Specific Adherence Scale (MOS	To assess predictors of subsequent adherence among hospitalised ACS patients who had been sub-optimally adherent to heart-healthy diet, activity, and/or medications.	Interviews were transcribed and coded by trained raters via content analysis, and quantitative variables were compared between groups using chi-square analysis

					SAS) score <15/18.		and independent-samples t-tests
Koshoedo et al., (2015)	Understanding the complex interplay of barriers to physical activity amongst black and minority ethnic groups in the United Kingdom: a qualitative synthesis using meta-ethnography	United Kingdom	A qualitative synthesis using meta-ethnographic methods	(n=14)	Studies of barriers to engaging in physical activity among BME groups in the UK were included in the review.	To conduct a meta-ethnographic analysis of qualitative studies to identify barriers to Black and Minority Ethnic (BME) individuals engaging in physical activity in the UK context.	_____
Dumit et al., (2016)	Perspectives on barriers and facilitators to self-care in Lebanese cardiac patients: A qualitative descriptive study.	Lebanon	A qualitative descriptive study using individual interviews.	(n=15)	Participants, seven females and eight males, diagnosed with coronary artery disease at least a year ago and not in critical condition were recruited from the cardiology clinics of the medical centre in Beirut, Lebanon.	To explore self-care practices among Lebanese cardiac patients. Another aim was to reveal factors that might influence these self-care practices.	A qualitative descriptive analysis to summarize the content of the transcripts using data-driven codes, categories, and themes. Thematic analysis was followed.
Zhang et al., (2016)	Facilitators and barriers of adopting healthy lifestyle in rural China: a qualitative analysis through social capital perspectives.	China	Qualitative study using focus groups	(n=23)	Participants were recruited through community health workers. Participants were long-term community residents; over 18 years old;	To explore facilitators and barriers of adopting healthy lifestyles among residents in a rural community of China.	Data were qualitatively analyzed through thematic approach.

					and information-rich about lifestyle related issues.		
Kokab et al., (2017)	The experience and influence of social support and social dynamics on cardiovascular disease prevention in migrant Pakistani communities:	_____	A qualitative synthesis study	(n=16)	Studies were included only if they were conducted in high-income 'developed' countries (such as Canada or the UK).	To synthesise qualitative literature about the perceived influence and experience of social support, in relation to cardiovascular disease (CVD) prevention in migrant Pakistani communities.	Articles were analysed using an adapted meta-ethnography approach.
Nicolai et al., (2017)	To change or not to change - That is the question: A qualitative study of lifestyle changes following acute myocardial infarction.	Germany	Qualitative interview study	(n=21)	Participants recruited had a confirmed AMI, were able to speak German and had no active mental or physical diagnoses that might affect the ability to participate.	To investigate key factors related to lifestyle changes following acute myocardial infarction (AMI) by eliciting survivors' subjective needs for, attitudes towards and experiences with behaviour changes in their everyday life to improve future interventions promoting lifestyle changes.	The data were analysed using qualitative content analysis.
Won and Son, (2017)	Perceived social support and physical activity among	South Korea	A cross-sectional descriptive study	(n=237)	Participants were 18 years and older, had been	To identify the relationship between perceived	The data were analysed using SPSS for

	patients with coronary artery disease.				diagnosed with stable CAD, had 6 months post-successful PCI, and were in Canadian Cardiovascular Society Angina Classification Grade II or I.	social support from health care providers and physical activity among patients with stable coronary artery disease	Windows Version 21.0
Dennison et al., (2018)	The association between psychosocial factors and change in lifestyle behaviour following lifestyle advice and information about cardiovascular disease risk	England	A cohort study	(n=716)	Participants (56% male; mean age 57 years) from the intervention arms of the Information and Risk Modification (INFORM) trial, a randomised controlled trial to assess the impact of providing CVD risk and web-based lifestyle information were analysed as a prospective cohort.	To investigate the association between social support, stress and mood, and change in PA and FVI following provision of CVD risk information and web-based lifestyle advice.	Linear and logistic regression analyses were used to quantify the association between social support, stress and mood at baseline and behaviour change following the intervention

Appendix 2 Research information leaflet English

Research Information Leaflet:

An Exploration of the Factors that Influence the Adoption of Healthy Lifestyles among Saudis Living with Cardiovasular Disease (CVD)

What is this about?
You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Talk to others about the study if you wish. Contact us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

The Study
The study is interested in exploring the factors that influence the adoption of healthy lifestyles, such as physical activity, healthy diet and smoking cessation, among Saudis suffering from Cardiovascular Disease, which is a disease of the heart and blood vessels. Exploring these factors can increase the understanding of their experiences and gain more insight into their behaviours and needs. The information collected will be used to develop ways in which health professionals can help support people with CVD to promote the adoption and maintenance of healthy lifestyles.

Why have I been asked to take part?
We are asking all Saudis (men and women) diagnosed with Coronary Heart Diseases age 35 or over who are currently hospitalized within this hospital after experiencing a cardiac event. The term cardiac event describes conditions including: heart attack (Myocardial Infarction), angina, Acute Coronary Syndrome, and Coronary Artery Bypass Graft Surgery (CABG).

Do I have to take part?
No, it is up to you to decide whether or not to take part. If you decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. Deciding not to take part or withdrawing from the study will not affect the healthcare that you receive.

What will happen if I take part?
If you decide to take part you will be interviewed by a researcher. The interview will take place in a private room and will take on average 45-60 minutes to complete. The interviews would be digitally recorded. During the interview you will be asked questions about your experience with adopting and maintaining healthy lifestyle. You will be also asked what your thoughts are on the barriers and facilitators to engage in healthy lifestyles.

Will my taking part in the study be kept confidential?
All the information we collect during the research will be treated confidently and stored anonymously and securely in accordance with the University of Edinburgh's Data Protection procedures. All data will be accessible to the research team only.

What are the possible benefits of taking part?
There are no direct benefits to you taking part in this study, but the results from this study might bring indirect benefits, such as contribution to society's knowledge and development of interventions to promote the adoption and maintenance of healthy lifestyles.

What are the possible disadvantages and risks of taking part?
It is not thought that there are any risks or disadvantages to taking part in this study. If at anytime however during the interview you become upset for any reason we will ensure that you have access to an appropriately trained person.

What will happen to the results of the study?
The results will be published in academic journals and at academic conferences. It is important to understand that your personal details will always remain confidential; you will not be identifiable in any published results. If you wish to receive a general summary of the results we will be able to provide these to you. We would need to obtain relevant contact details from you to do this.

If you have a concern about any aspect of this study please contact:
Afnan Tunsi
Tel: +966504669788
Email: s1162823@ed.ac.uk

If you wish to make a complaint about the study please contact:
Professor Charlotte Clarke
Head of School
School of Health in Social Science
Charlotte.Clarke@ed.ac.uk
+44 (0)131 650 4327
The University of Edinburgh

And for more information see (www.ed.ac.uk/files/imports/fileManager/WEB%20Complaint%20Form.pdf)

Appendix 3 Research information leaflet – Arabic

ملزمة معلومات البحث

إستكشاف العوامل المؤثرة في تبني أسلوب حياة صحي لدى السعوديين الذين يعانون من أمراض القلب والاوعية الدموية

الموضوع:

أنت مدعو للمشاركة في هذه الدراسة البحثية. و قبل اتخاذك لقرار المشاركة ينبغي عليك أن تدرك الغرض من اجراء هذا البحث. لذا يرجى التكرم بقراءه المعلومات التاليه بعناية فائقة و التفكر بالأمر جيداً. و بإمكانكم الإتصال بنا للحصول على مزيد من المعلومات.

الدراسة:

تعنى هذه الدراسة باكتشاف العوامل المؤثرة في اتخاذ نظام صحي لدى السعوديين الذين يعانون من مرض الاوعية الدموية حتى يتسنى لنا التعرف على تجاربهم و استيعاب انماط سلوكهم و احتياجاتهم. و سيتم استخدام هذه المعلومات في تحسين الخدمات المقدمة لهؤلاءالمرضى لمساعدتهم في الإلتزام بأنماط سلوكية صحية جيدة.

لماذا تمت دعوتي للمشاركة؟

دعوتنا موجهة لجميع السعوديين (رجال و نساء) الذين تم تشخيص أمراض القلب لديهم و يبلغون من العمر ٣٥ سنة و ما فوق.

هل يتوجب عليّ المشاركة؟

لا، ليس إلزامياً، فالأمر متروك لإختيارك. إذا رغبت في المشاركة فستقدم إليكم استمارة المعلومات هذه و يطلب منكم التوقيع على نموذج الموافقة. و حتى في حالة إبداء الرغبة في المشاركة يمكنك التراجع عنها في أي وقت و بدون إبداء الأسباب. علماً بأن قرارك هذا لن يؤثر على الرعاية الصحية المقدمة لكم من قبل المستشفى.

ماذا سيحدث في حالة المشاركة؟

في حالة إبداء الرغبة في المشاركة، ستجرى معك مقابلة بواسطة باحث. ستجرى المقابلة في غرفة خاصة على مدى ٣٠-٤٥ دقيقة و يجرى تسجيلها إلكترونياً. سيتم خلال المقابلة الاستفسار عن تجربتك مع المرض و اتخاذك لنمط صحي معين في التعامل معه، و عن رأيك في المعوقات و الميسرات التي تواجهك للإلتزام بنمط صحي معين.

هل ستحظى مشاركتي بالسرية؟

يتم التعامل مع كافة المعلومات وحفظها بسرية تامة و وفق نظام حماية البيانات التابع لجامعة ادنبرة بالمملكة المتحدة، و ستكون متاحة فقط لفريق البحث.

ما الفوائد المتوقعه من المشاركة؟

ليست هناك فوائد مباشرة من المشاركة في البحث، الأ ان نتائج المشاركة ستؤدي الى فوائد غير مباشرة، من ضمنها المساهمة في تعزيز توعية المجتمع و تطوير الإجراءات المتعلقة بتحسين الأنماط الصحية المناسبة.

ما الأضرار و المخاطرالمتوقعه من المشاركة في البحث؟

ليست هناك أي أضرار أو مخاطر متوقعة نتيجة المشاركة في هذا البحث.

و ماذا عن نتائج البحث؟

سيتم نشر نتائج البحث في مجلات و مؤتمرات أكاديمية. و من الضرورة التأكيد هنا أن بياناتك الشخصية ستظل على الدوام محفوظة بسرية تامة و لن يشار إليها من ضمن نتائج البحث. و إذا رغبت في الحصول على ملخص النتائج فإننا على استعداد لتوفيره لك، على أن تزودنا بالعنوان الذي يمكن إرساله إليكم عليه.

ماذا أفعل إذا كان لدي مشكلة أو إستفسار؟

يمكنم الاتصال ب (أفنان تونسي) على هاتف رقم (٠٥٠٤٦٦٩٧٨٨) و ستفعل ما بوسعها لإجابة استفساراتك

و في حالة الرغبة في تقديم شكوى عن الدراسة يمكنم التواصل مع:

بروفيسور شارلوت كلارك هاتف: (٠٠٤٤١٣١٦٥٠٤٣٢٧) جامعة ادنبرة. و لمزيد من المعلومات يرجى الإطلاع على الرابط المرفق:

(www.ed.ac.uk/files/imports/fileManager/WEB%20Complaint%20Form.pdf)

Research Information Leaflet Version 1 dated 13/06/2016

Appendix 4 Consent form – English

Ministry of Defense
Medical Services Department
King Fahad Armed Forces Hospital
Jeddah – Saudi Arabia

M.S.D.

This informed consent Form is for Saudis living with Cardiovascular Disease and whom we are inviting to participate in a research study titled "An Exploration of The Factors that Influence the Adoption of Healthy Lifestyles among Saudis Living with Cardiovascular Disease (CVD)"

Name of Principle Investigator: Afnan Tunsi, PhD student, School of Health in Social Science, The University of Edinburgh
Name of Organization: King Fahad Armed Forces Hospital (KFAFH)
Name of Project: An Exploration of the Factors that Influence the Adoption of Healthy Lifestyle among Saudis Living with Cardiovascular Disease (CVD)

This Informed Consent Form has two parts:

- **Information Sheet (to share information about the study with you)**
- **Certificate of Consent (for signatures if you choose to participate)**

You will be given a copy of the full Informed Consent Form

Part I: Information Sheet

Introduction
I am Afnan Tunsi, A PhD student at the University of Edinburgh. I am undertaking a research study exploring the factors influencing lifestyle changes among Saudis suffering from cardiovascular disease (CVD), which is a disease of heart and blood vessels that is now becoming one of the most threatening health problems among Saudi population. I am going to give you information and invite you to be part of this research. You do not have to decide today whether or not you will participate in the research. Before you decide, you can talk to anyone you feel comfortable with about the research.
This Information Sheet may contain words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask any of the healthcare providers to contact me and I will get back to you as soon as possible.

Purpose of the research
Adoption and maintenance of healthy lifestyles can lead to rapid and substantial decreases in the risk of CVD and limit the disease progression. This study is designed to explore the factors that may influence the decision of Saudis diagnosed with CVD to engage in healthy lifestyle. We believe that you can help us by telling us your experience of the adoption and maintenance of healthy lifestyle, such as physical activity, consumption of healthy diet and smoking cessation. We want to learn about what you feel helps you and what stops you from engaging in healthy lifestyles. This knowledge might help us learn how to better understand the effect CVD has on Saudis.

Type of Research Intervention
This research will involve your participation in an individual interview that will take about 45 minutes to one hour with myself

Participant Selection
You are being invited to take part in this research because we feel that your experiences can contribute much to our understanding and knowledge of lifestyle change in Saudis living with CVD.

Voluntary Participation
Your participation in this research is entirely voluntary. It is your choice whether to participate or not. If you choose not to participate all the services you receive at this hospital will continue and nothing will change.

Procedures
We are asking you to help us learn more about the factors influencing the adoption of healthy lifestyles among Saudis living with CVD. We are inviting you to take part in this research project. If you accept, you will be asked to participate in an interview with me. During the interview, I will sit down with you in a comfortable place at the hospital. If you do not wish to answer any of the questions during the interview, you may say so and I will move on to the next question. No one else but me will be present unless you would like someone else to be there. The entire interview will be digital-recorded, but you will not be identified by name on the recording. Instead, each individual interview will be given a code number. The audio file will be encrypted, and all documents will be kept in a locked cabinet. The information recorded is confidential, and no one else except the research team (Afnan Tunsi, Dr Colin Chandler, and Dr Aisha Holloway) will have access to the information documented during your interview.

Duration
The research will take place over 3 months at this hospital. During that time, you will be interviewed once and the interview will take about 45 minutes to one hour.

Risks
We are asking you to share with us some very personal and confidential information, and you may feel uncomfortable talking about some of the topics. You do not have to answer any question if you don't wish to do so. You do not have to give us any reason for not responding to any question, or for refusing to take part in the interview. If you request further information about your condition during the interview I can arrange for someone from the nursing team to speak to you about this.

Benefits
There are no direct benefits to you taking part in this study, but your participation is likely to help us find out more about what prevent and facilitate lifestyle change among Saudis. Results from this study might bring indirect benefits, such as contribution to society's knowledge and development of ways in which health professionals can help support people with CVD to promote the adoption and maintenance of healthy lifestyles.

Reimbursements
You will not be provided any incentive to take part in the research.

Confidentiality
I will not be sharing information about you to anyone outside of the research team. The information collected from this research project will be kept private. Any information about you will have a code number on it instead of your name. I will not know each number represents which participant either (informed consents are kept separately from documents or files). The audio files will be encrypted, and all documents will be kept in a locked cabinet.

Sharing the Results
The results will be published in academic journals and at academic conferences. It is important to understand that your personal details will always remain confidential; you will not be identifiable in any published results. If you wish to receive a general summary of the results we will be able to provide these to you. We would need to obtain relevant contact details from you to do this.

Right to Refuse or Withdraw
You do not have to take part in this research if you do not wish to do so, and choosing not to participate will not affect the healthcare that you receive in this hospital. You may stop participating in the interview at any time that you wish without giving a reason.

Who to Contact
If you have any questions, you can ask them now or later. If you have a concern about any aspect of this study please contact:
Afnan Tunsi
Tel: +966504669788/ +447495344490
Email: s1162823@ed.ac.uk

This proposal has been reviewed and approved by the Research Ethics Committee (REC) at the University of Edinburgh, which is a committee whose task it is to make sure that research participants are protected from harm. If you wish to find about more about the REC, contact Tel: +44(0) 131 651 3969. Address: Medical School (Doorway 6), Teviot Place, Edinburgh EH8 9AG. Email: health@ed.ac.uk.

If you wish to make a complaint about the study please contact Professor Charlotte Clarke, Head of School, School of Health in Social Science, The University of Edinburgh. Tel: +44 (0)131 650 4327 Email: Charlotte.Clarke@ed.ac.uk.

And for more information see
(www.ed.ac.uk/files/imports/fileManager/WEB%20Complaint%20Form.pdf)

You can ask me any more questions about any part of the research study, if you wish to. Do you have any questions?

Part II: Certificate of Consent

Participant:
By signing below, you have read the foregoing information. You have been informed about this study's purpose, procedure, possible benefits and risks, and you have been given the opportunity to ask questions before you sign. You have had the opportunity to ask questions about the study and your questions have been answered to your satisfaction. You consent voluntarily to be a participant in this study. By signing this form, you are not waiving any of your legal rights. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled, and you may discontinue participation at any time without penalty, to which you are otherwise entitled.

Print Name of Participant_____

Signature of Participant _____

Date _____ (Day/month/year)

If illiterate

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Print name of witness_____ **Thumbprint of participant**

Signature of witness _____

Date _____ (Day/month/year)

Researcher:
I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands the purpose, the procedure, the benefits, and the risks that are involved in this research study.
I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily. A copy of this form has been provided to the participant.

Print Name of Researcher_____

Signature of Researcher _____

Date _____ (Day/month/year)

Appendix 5 Consent form - Arabic

خطاب إقرار

خطاب موافقة للسعوديين المصابون بمرض القلب والأوعية الدموية الذين تمت دعوتهم للمشاركة في دراسة بحثية بعنوان " دراسة استكشافية للعوامل المؤثرة على تبني أسلوب حياة صحي لدى السعوديين الذين يعانون من أمراض القلب و الأوعية الدموية"

اسم الباحث الرئيسي: أفنان تونسي، طالبة دكتوراه، كلية العلوم الصحية و الاجتماعية، جامعة أدنبرة، المملكة المتحدة
اسم المنظمة: مستشفى جامعة الملك عبدالعزيز
اسم البحث: دراسة استكشافية للعوامل المؤثرة على تبني أسلوب حياة صحي لدى السعوديين الذين يعانون من أمراض القلب والأوعية الدموية.

خطاب الموافقة هذا يضم جزئيين:

- **ورقة المعلومات المتعلقة بالدراسة**
- **شهادة الموافقة (للتوقيعات في حال رغبت في المشاركة في البحث)**

سيتم إعطائك نسخة من هذا الخطاب في حال تمت الموافقة على المشاركة في البحث

الجزء الأول: ورقة المعلومات:

مقدمة:
أنا الباحثة أفنان تونسي، طالبة دكتوراه في جامعة أدنبرة بالمملكة المتحدة. أقوم حالياً بإجراء دراسة بحثية تُعنى باكتشاف العوامل المؤثرة في تبني أسلوب حياة صحي لدى السعوديين الذين يعانون من أمراض القلب والأوعية الدموية، وهو أصبح من ضمن الأمراض الأكثر شيوعاً بين السعوديين. سأقوم بتزويدك بمعلومات البحث ودعوتك للمشاركة الا انه لا يتوجب عليك اتخاذ القرار بالمشاركة من عدمه الآن. ورقة المعلومات هذه قد تحتوي على كلمات يصعب فهمها، يرجى مداخلتي للاستفسار عنها وسأوجد وقت كافي لشرحها.

الهدف من الدراسة:
تبني نظام صحي لدى مرضى القلب والأوعية الدموية قد يؤدي الي انخفاض جوهري وسريع في اخطار المرض ويحد من تطوره. هذه الدراسه صممت لاكتشاف العوامل التي قد تؤثر على اتخاذ نظام صحي سليم بين المصابين بمرض القلب والأوعيه الدموية. نحن نعتقد بانك بإمكانك مساعدتنا من خلال مشاركتك في البحث واخبارنا بتجربتك في تبني سلوك صحي جيد، كتناول طعام صحي، القيام بمجهود رياضي والامتناع عن التدخين. هدفنا من الدراسة هو معرفة رأيك في المعوقات والميسرات التي تواجهك للالتزام بنمط صحي معين. هذه المعلومات ستساهم في زيادة وعي المجتمع واستيعاب المؤثرات النفسية والمجتمعية على هذا المرض.

نوع الاجراء البحثي:
مشاركتك في هذه الدراسة ستتضمن مقابلة شخصية مع الباحث الرئيسي لمدة تتراوح ما بين ٣٠ الى ٤٥ دقيقة لمره واحدة فقط.

اختيار المشاركين:
انت مدعو للمشركة في هذه الدراسة البحثية لأننا نشعر بأن تجربتك الشخصيه مع المرض قد تساهم في تعزيز معلوماتنا عن تبني أنماط حياة صحية ما بين السعوديين المصابين بمرض القلب والأوعية الدموية.

المشاركة الاختيارية:
مشاركتك في هذه الدراسه اختيارية كلياً، فالقرار بالمشاركة من عدمه يعود الى اختيارك الشخصي. يجب التنويه بأن جميع الخدمات المقدمة لك من قبل المستشفى لن تتأثر إذا اتخذت القرار بعدم المشاركة في الدراسة.

الإجراءات:
في حال اتخذت القرار بالمشاركة في الدراسة، سيقوم الباحث الرئيسي بإجراء مقابلة شخصية معك. بإمكانك الامتناع عن الإجابة عن أي سؤال إذا شعرت بعدم الرغبة في ذلك وسأنتقل فوراً للسؤال الذي يليه. لن يكون أي شخص متواجد خلال المقابلة الا إذا رغبت في تواجد شخص معين معك. المقابله سيتم تسجيلها الكترونياً ولن يتم التعرف على هويتك من خلال التسجيل. عملية إخفاء الهوية ستتم عن طريق تعيين رمز معين بدلاً عن اسم المشارك لكل مقابلة شخصية وتشفير المقاطع الصوتية. جميع المستندات سيتم حفظها في خزانة مغلقة برقم سرّي. جميع المعلومات سيتم التعامل معها بسرية تامة ولن يطلع عليها سوى فريق البحث (أفنان تونسي، د. كولين شاندلر، د. عائشه هولواي).

المخاطر:
ليست هناك أي اضرار أو مخاطر متوقعة نتيجة مشاركتك في هذا البحث.

الفوائد:
ليست هناك فوائد مباشرة نتيجة مشاركتك في البحث، الا أن نتائج المشاركة ستؤدي الى فوائد غير مباشرة كالمساهمة في تعزيز توعية المجتمع وتطوير الاجراءات المتعلقة بتحسين الأنماط الصحية المناسبة.

السرية:
ستعامل جميع المعلومات التي تم جمعها بسرية تامة و لن يتم تداولها مع أي شخص خارج فريق البحث. أي بيانات خاصة بالمشاركين سيرمز لها برمز خاص عوضاً عن اسمائهم. الملفات الصوتية سيتم تشفيرها و ستحفظ مع بقية المستندات في خزنة مغلقة برقم سري

نشر النتائج:
سيتم نشر نتائج البحث في مجلات و مؤتمرات أكاديمية. من الضرورة التأكيد هنا أن بياناتك الشخصية ستظل على الدوام محفوظة بسرية تامة و لن يشار إليها من ضمن نتائج البحث. و إذا رغبت في الحصول على ملخص النتائج فإننا على استعداد لتوفيره لك، على أن تزودنا بالعنوان الذي يمكن إرساله إليكم عليه.

الحق في الرفض أو الانسحاب:
ليس من الضروري المشاركة في البحث اذا لم ترغب في ذلك، كما يمكنك الانسحاب من المقابلة في أي وقت و بدون إبداء أسباب لذلك.

للتواصل:
اذا كان لديك أي سؤال أو رغبة في الاستفسار يمكنك طرحه الآن أو لاحقاً. كما يمكنكم التواصل مع الباحث الرئيسي على العنوان التالي:
أفنان تونسي
جوال: ٠٥٠٤٦٦٩٧٨٨
إيميل: s11622823@ed.ac.uk

هذا البحث تم مراجعته و الموافقة عليه من قبل لجنة أخلاقيات الأبحاث بجامعة أدنبره، و هي لجنة تعنى بحماية المشاركين في الأبحاث من الضرر. و لمزيد من المعلومات عن هذه اللجنة يمكنك الاتصال على: (٠٠٤٤١٣١٦٥١٣٩٦٩)، أو بريد الكتروني: health@ed.ac.uk

و في حالة الرغبة في تقديم شكوى عن الدراسة يمكنم التواصل مع:
بروفيسور شارلوت كلارك، هاتف: (٠٠٤٤١٣١٦٥٠٤٣٢٧) جامعة ادنبرة.
و لمزيد من المعلومات يرجى الإطلاع على الرابط المرفق:

www.ed.ac.uk/files/imports/fileManager/WEB%20Complaint%20Form.pdf

يمكنك طرح أي سؤال يتعلق بالدراسة الآن اذا رغبت في ذلك، هل لديك أي سؤال؟

الجزء الثاني: شهادة الموافقة:

المشارك:
بالتوقيع على هذا أقر أني قد قمت بقراءة جميع المعلومات السابقة و أنه تم إشعاري بهدف الدراسة، نوع الاجراء البحثي،والفوائد و المخاطر المتوقعة. كما أقر بإنه تم اتاحة الفرصة لي لطرح أي أسئلة متعلقة بالبحث قبل التوقيع و أجيبت بشكل واف. كما أقر بأن مشاركتي في الدراسة أختيارية كلياً و أن رفض المشاركة لا يترتب عليه أي عقوبة أو فقدان للمنافع أو الحقوق، كما يمكنني التوقف عن المشاركة في أي وقت بدون عقوبات أو مبررات.

الاسم الثلاثي للمشارك _____

توقيع المشارك: _____

التاريخ: _____

للغير قادرين على القراءة:

بالتوقيع على هذا أشهد على دقة قراءة نموذج الموافقة من قبل المشارك و أنه قد اتيحت له الفرصة لطرح الاسئلة. كما أشهد بأن الموافقة تمت بشكل إختياري.

الاسم الثلاثي للشاهد _____

توقيع الشاهد: _____

التاريخ: _____

بصمة المشارك

الباحث:
أقربأني قد قمت بقراءة جميع المعلومات بعناية فائقة للمشارك و أني قمت بقصار جهدي لتوضيح الهدف من الدراسة، نوع الاجراء البحثي،والفوائد و المخاطر المتوقعة من المشاركة في البحث وأني قد أتحت الفرصة للمشارك لطرح الاسئلة و قمت بإجابتها بشكل وافٍ. كما أقر بأن المشارك لم يتم إكراهه لإعطاء الموافقة، بل تمت بشكل حر و إختياري. تم منح المشارك نسخة من هذا النموذج.

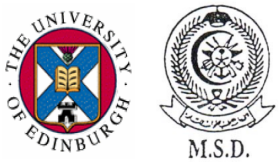
الاسم الثلاثي للباحث: _____

توقيع الباحث: _____

التاريخ: _____

Appendix 6 Demographic information sheet - English

An Exploration of the Factors that Influence the Adoption of Healthy Lifestyle among Saudis Living with Cardiovasular Disease



Socio Demographic Details: **Code number (_____)**
▪ Age _____
▪ Gender: • Male • Female
▪ Level of Education: • Less than high-school • High school or equivalent • College graduate • Post graduate • Other _____
▪ Marital Status: • Single • Married • Divorced • Separated • Widowed • Other _____
▪ Source of Income: • Paid employment • Spouse/family friends • Welfare/unemployed • Other _____
▪ Diagnosis: _____
▪ Length of time since diagnosis: _____
▪ Reason for most recent hospitalization: _____

Socio Demographic Details dated 28/06/2016

Appendix 7 Demographic information sheet - Arabic

إستكشاف العوامل المؤثرة في تبني أسلوب حياة صحي لدى
السعوديين الذين يعانون من أمراض القلب والاوعية الدموية

المعلومات الاجتماعية و الديموغرافية (رقم الرمز: _____)
• العمر: _____
• الجنس: ▪ ذكر ▪ انثى
• مستوى التعليم: ▪ أقل من الثانوية العامة ▪ ثانوية عامه أو ما يعادلها ▪ خريج جامعة أو معهد ▪ دراسات عليا ▪ أخرى _____
• الحالة الاجتماعية: ▪ متزوج ▪ أعزب ▪ مطلق ▪ منفصل ▪ أرمل
• مصدر الدخل: ▪ وظيفة مدفوعة الأجر ▪ الزوج/ الأقارب ▪ دعم خيري ▪ أخرى _____
• التشخيص: _____
• عدد السنوات منذ التشخيص: _____
• سبب آخر تنويم في المستشفى: _____

Socio Demographic Details dated 28/06/2016

Appendix 8 Interview guide

A. Tunsi

Semi-structured Interview Guide:

Self-introducing the interviewer:

Hello. My name is Afnan Tunsi and I am a student at the University of Edinburgh. How are you? [Icebreaker]. I am conducting this study to help understand the things that may influence someone like you who suffer from heart condition to take part in healthy activities such as physical activity, consumption of healthy diet and smoking cessation. I will be asking you a series of questions about your thoughts on these activities or activities such as these. I appreciate your time and respect your privacy; your answers are completely confidential. More importantly, your name will not be used when we use the data we collect. I do want to let you know that I am recording our conversation so that I don't miss any of your responses, is this okay with you? I also want to reassure you that there is no right or wrong answer to any question. I am speaking with you now just to learn more about your thoughts.

تعريف شخصي للقائم بالمعاينة ..

إسمي/ أفنان تونسي طالبه دكتوراه بجامعة إدنبره، كيف حالك؟ وإني أقوم بهذه الدراسة للإسهام في التعرف على العوامل التي يمكن أن تؤثر في إتخاذ السعوديين الذين يعانون من أمراض الأوعية الدموية القرار بشان الاشتراك في نمط صحي محدد مثل الأنشطة البدنية .. الغذاء الصحي وبرامج التوقف عن التدخين.

وساقوم بتوجيه عدد من الأسئلة إليك عن تجربتك في الإلتزام بنمط حياة معين.

ومع تقديري لوقتك واحترامي لخصوصياتك فإني أؤكد لك السرية الكاملة لإجاباتك، والأهم من ذلك أن اسمك لن يرد أبداً ضمن البيانات التي نقوم بجمعها. كما أود إفادتك بأني أقوم بتسجيل المناقشة التي نجريها معك لضمان إستيفائها كاملة، آملاً ألا يكون في ذلك أي مانع.

Questions guideline (interview questions may change based upon participants' answers)

Initial Open-ended Questions: *(assessment of awareness and knowledge base)*

- When did you first notice change in your health?
- Why you were recently hospitalized? Could you tell me what happened?
- Could you describe your feelings when you became unwell?
- What was going in your life then? How would you describe how you viewed your lifestyle before you become unwell? (physical activity, consumption of healthy diet and smoking cessation).
- How has your view of the importance of being physical active, eating healthy diet and not smoking changed after you became unwell?
- Do you feel there are things that an individual can make to prevent heart disease?
- Before this hospitalization, what did you do stay healthy? Can you describe your typical (diet, physical activity, smoking) routine?
-

أسئلة أساسية مفتوحة:

- متى لاحظت تغير في صحتك؟
- ما سبب اخر تنويم لك بالمستشفى؟ يمكنك وصف ما حدث بالتفصيل؟
- ممكن تصف شعورك عند بداية شعورك بالتعب؟
- ماذا جرى بعد ذلك في وتيرة حياتك؟ وكيف تصف لنا نظرتك لنمط حياتك قبل مرضك؟ (وذلك بالنظر إلى التمارين البدنية وبرامج الغذاء الصحي والإمتناع عن التدخين).
- كيف تغيرت نظرتك لأهمية التمارين البدنية وبرامج التغذية الصحية والإمتناع عن التدخين بعد علمك بمرض القلب؟
- هل تشعر بأن هناك أشياء يمكن للفرد القيام بها لمنع المرض ؟
- ماذا فعلت من أجل البقاء بصحة تامة قبل هذه المعالجة؟ هل يمكن أن تذكر لنا النظام الغذائي والرياضي وبرامج التوقف عن التدخين التي كنت تتبعها؟

1

Intermediate Questions: *(Socioecological Model)*

Microsystem/ Intrapersonal factors

- Is it important for you to eat healthy diet, stay physically active and avoid smoking? Why is that? How does that make you feel?
- What things about you as a person; your beliefs, thoughts, attitudes and behaviors, help you to eat healthy diet, stay physically active and avoid smoking?
- What things about you as a person prevent you from eating healthy diet, staying physically active and avoid smoking?
- هل من الضروري لك الإلتزام بغذاء صحي وبرامج رياضية و الإمتناع عن التدخين؟لماذا؟ ماذا يجعلك تشعر؟
- ما الاشياء الشخصية ، كمعتقداتك ،أفكارك ، توجهاتك وتصرفاتك عموماً التي يمكن أن تساعدك في الإلتزام بغذاء صحي وبرامج رياضية محددة وأخرى للإمتناع عن التدخين؟
- وما هي الأشياء التي تمنعك من الإلتزام ببرامج تغذية صحية ورياضية وإمتناع عن التدخين؟

- *Mesosystem/ Interpersonal factors:*
- Who do you spend time with ? What things do you do together?
- In what way the actions and reactions of any of these people made it easier for you to eat healthy diet, stay physically active and avoid smoking?
- In what way the actions and reactions of any of these people made it harder for you to eat healthy diet, stay physically active and avoid smoking?
- Probes: when was that? How were they involved?

- مع من تقضي معظم وقتك ؟ ماذا تفعل معهم ؟
- بأي طريقة تؤدي أفعال أو تفاعلات أو تعليقات أو تصرفات أي من هؤلاء إلى مساعدتك في الإلتزام بنظام التغذية الصحية والنشاط الرياضي وبرامج الإمتناع عن التدخين؟
- بأي طريقة تؤدي أفعال أو تفاعلات أو تعليقات أو تصرفات أي من هؤلاء إلى منعك من الإلتزام بنظام التغذية الصحية والنشاط الرياضي وبرامج الإمتناع عن التدخين؟
- متى كان ذلك؟ وكيف تم؟

- *Exosystem/ Community factors:*
- How does the (community, your neighborhood, your work environment, your financial status, the medical services that you receive) affect your healthy lifestyle? (Ask each at a time)
- In what way these things made it easier for you to eat healthy diet stay physically active and avoid smoking?
- In what way, if any, of these things made it harder for you to eat healthy diet, stay physically active and avoid smoking?
- كيف يمكن لمجتمعك، الحي الذي تسكن فيه، مجال عملك، وضعك المالي، بيئتك الإجتماعية والخدمات الطبية التي تتلقاها أن تؤثر على نمط حياتك؟
- بأي طريقة يمكن أن تعينك هذه الأوضاع في الإلتزام بنظام غذائي صحي أو نشاط رياضي محدد أو برامج للأمتناع عن التدخين ؟
- وفي المقابل بأي طريقة تؤدي هذه الأوضاع إلى عدم إلتزامك بنظام غذائي صحي أو نشاط رياضي محدد أو برامج للإمتناع عن التدخين؟

- *Macrosystem/ Public policy:*
- How does the (government, politics, culture, religion, and public policy) affect your healthy lifestyle? (Ask each at a time)
- In what way, if any, of these things or systems made it easier for you to eat healthy diet, stay physically active and avoid smoking?

- In what way, if any, of these things or systems made it harder for you to eat healthy diet, stay physically active and avoid smoking?
- Could I ask you what are the most important lessons you learned through managing your illness?
- Where do you see yourself in two years? Describe the person you hope to be then?

- والآن أنظر إلى مسائل أخرى مثل الحكومة، السياسة، الثقافة، الديانة، النظام المجتمعي:
  - بأي طريقة إن وجدت تعينك هذه المسائل في الإلتزام بنظام غذائي صحي أو نشاط رياضي محدد أو برامج للإمتناع عن التدخين؟
  - وفي المقابل – بأي طريقة إن وجدت تحول هذه المسائل دون إلتزامك بنظام غذائي صحي أو نشاط رياضي أو برامج للإمتناع عن التدخين؟
- ما هو الشيء الذي وجدته أكثر عوناً لك في تغيير نمط حياتك؟ ولماذا؟
- هل يمكنني التعرف على أفضل الدروس التي تعلمتها من خلال معايشتك لمرض القلب؟
- كيف تتصور نفسك بعد عامين؟ صف الوضع الذي تأمل أن تكون عليه بعد هذه الفترة؟

Ending questions

- Thinking about yourself, do you think this has changed you as a person? In what way?
- Tell me about the strengths that you discovered or developed through managing your illness. What do you most value about yourself now? What do others most value in you?
- After having these experiences, what advice would you give to someone like you who suffers from heart condition?
- Is there something that you might not think about before that occurred to you during this interview?
- Is there anything else you think I should know to understand better?
- Is there anything you would like to ask me?

Probes:

1) Why?

2) Please describe the situation.

3) How did it happen? How did you response?

3) What contributed to this change or continuity?

4) What helps you to manage?

5) As you look back, are there any things that stand out in your mind?

أسئلة ختامية

- كيف تدرجت كشخص منذ تشخيص المرض لديك؟ بين لي جوانب القوة التي اكتسبتها خلال فترة تغيير نمط حياتك، وكيف تقيّم وضعك الحالي؟ وكيف يراك الآخرون؟
- بعد إكتسابك هذه الخبرات، ما هي النصيحة التي تسديها لمن تم تشخيص المرض لديه حديثاً؟
- هل حدث لك أي شيء غير متوقع أثناء هذه المقابلة؟
- هل هناك أي شيء آخر ترى أنه ينبغي عليّ معرفته لاستكمال فهم الحالة؟
- هل ترغب في توجيه أي سؤال؟

1- لماذا.
2- صف الوضع.
3- كيف حدث؟ وكيف كان رد الفعل لديك؟
4- ما الذي أسهم في هذا التغيير أو الاستمرار؟
5- ما الذي ساعدك في مواجهة هذا الموقف؟
6- هل هناك أي شيء لازال عالقاً في ذهنك؟

Appendix 9 Copies of approval letters

Ref: NURS018

Afnan Tunsi
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School of Health in Social Science
Medical School
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SCHOOL OF HEALTH IN SOCIAL SCIENCE
The University of Edinburgh
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13 July 2016

E-mail: Susanne.Kean@ed.ac.uk Tel: 0131 651 1983
E-mail: Sarah.Rhynas@ed.ac.uk Tel: 0131 650 3882
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Dear Afnan

RESEARCH ETHICS APPLICATION FOR LEVEL 2/3 APPROVAL

PROJECT TITLE: An Exploration of the factors that Influence the Adoption of Healthy Lifestyles among Saudi Women Living with Cardiovascular Diseases (CVD)

Thank you for submitting the above research project for review by the Section of Nursing Studies Ethics Research Panel.

I can confirm that the submission has been independently reviewed and was approved on 28 June 2016.

Should there be any change to the research protocol, it is important that you alert us as this may necessitate further review.

Yours sincerely

Susanne Kean

Sarah J. Rhynas

Susanne Kean
Researcher/Lecturer
Nursing Studies

Sarah J Rhynas
Teaching Fellow
Nursing Studies

KINGDOM OF SAUDI ARABIA
Ministry of Education
KING ABDULAZIZ UNIVERSITY
Faculty of Medicine

Ref.: .....
Date.: / /
Encl.: .....

المملكة العربية السعودية
وزارة التعليم
جامعة الملك عبد العزيز
كلية الطب

الرقم : .....
التاريخ : / / ١٤ هـ
المرفقات : .....

UNIT OF
BIOMEDICAL ETHICS
Research Committee

Initial Approval

TO: Principal Investigator: Ms. Afnan Tunsi
(PhD Student in Nursing Studies at the University of Edinburgh ,Lecturer in Medical Surgical Dept. Faculty of Nursing KAU.)
External supervisor: Dr. Colin Chandler
Date: Tuesday, June 28, 2016

From: Professor. Hasan Alzahrani
External supervisor: Dr. Aisha Holloway
CC:Vice-Dean, University /Hospital Director & Academic Affairs & File & Mentoring Committee

RE:" An Exploration of the Factors that Influence the Adoption of Healthy Lifestyle among Saudi Women Living with cardiovascular Disease " Non Intervention - Qualitative Research (Reference No 279-16)

The above titled research/study proposal has been examined with the following enclosures:

- The Study Protocol.
- Informed Consent Form .
- Data collection Sheet.

The REC recommended granting permission of approval to conduct the project along the following terms:

1. The PI and Supervisors are responsible to get Academic Affairs, NRC, hospital and departmental approval.
2. The Investigators will conduct the study under the direct supervision by the Nursing Research Committee.
3. Provide to committee" Continuing Review Progress Report "every 6 months.
4. Any amendments to the approved protocol or any element of the submitted documents should NOT be undertaken without prior re-submission to, and approval of the REC for prior approval.
5. Monitoring: the project may be subject to an audit or any other form of monitoring by the REC.
6. The PI is responsible for the storage and retention of original data of the study for a minimum period of five years.
7. The PI is expected to submit a final report at the end of the study.
8. The PI must provide to REC a conclusion abstract and the manuscript before publication.
9. To follow all regulations issued by the National Committee of Bio & Med ethics - King Abdul Aziz City for Science and Technology.

The Organization & operating procedure of the KAU. Faculty of Medicine - Research Ethics Committee(REC) are based on the Good Clinical Practice (GCP) Guidelines.
PLEASE NOTE THAT THIS APPROVAL IS VALID FOR ONE YEAR COMMENCING FROM THE DATE OF THIS LETTER.

Professor Hasan Alzahrani
Chairman of the Research Ethics Committee

(HA-02-J-008) No of Registration At National Committee of Bio.& Med. Ethics.
Mohammed S. ALsearee (Reference No 279-16)

ص . ب ٨٠٢٠٥ جـــــدة ٢١٥٨٩
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مستشفى الملك فهد للقوات المسلحة
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المملكة العربية السعودية

King Fahd Armed Forces Hospital - Jeddah

Research and Ethics Committee

Reference Ethical Number: REC 192

To: Mrs. Afnan Tunsi
PHD Student

From : Brig. Gen. Dr. Abdullah Mohammed Al-Jiffri
Chairman of the Research and Ethics Committee

Date 1/Jan/2017

Subject: Firm Approval for the Research (An Exploration of the Factors that Influence the Adoption of Healthy Lifestyles among Saudi Women Living with Cardiovascular Diseases. (CVD).

We are pleased to inform you that the above research proposal was approved today through an expedited pathway of the Research and Ethics Committee. The committee is hereby giving you the authority to commence with your research study.

Please note that you are required to submit as update to the committee until the conclusion of your study.

Brig. Gen. Dr. Abdullah Mohammed Al-Jiffri
Chairman of the Research and Ethics Committee

M. Al-Makadi

Copy: To the File

Appendix 10 Samples of initial coding of transcripts

Initial Coding of transcript KAU15

74 y. male, college graduate, married, retired, urban, diagnosed with CHD for 6 years, post MI, interviewed at the University hospital.

Narrative Data	Initial Codes
I: May I ask you, when did you first notice a change in your health?	
P: I will tell you from the beginning. The problem started 6 years ago. One day I was walking to the mosque for Asar prayer and on my way back home I felt really unwell. I walk everyday. It is a habit. Anyway I felt heaviness in my chest and difficulty to breath. I wasn't sure I can arrive at home but Thank God I did. I wanted to go up the stairs but I couldn't. I called my son, he was in the living room who then called my daughter N. She was a surgical intern at that time. Anyway, they called an ambulance and I got admitted immediately to the hospital here. I didn't lose consciousness but I was very sick, unable to move or speak. It was a heart attack. I had an emergent cardiac catheterization and there was a blockage so they placed 3 stents. I was hospitalized for 3 days and then discharged. I was instructed to quit smoking so I did. I was scared at that time but after maybe a year I went back to smoking. 8 months ago, I felt the same symptoms I had in the first heart attack. It was night time this time. I felt severe tightness in my chest and difficulty breathing. But it was worse than the first time. Again I had an emergent cardiac catheterization and they placed 3 stents. It was harder on my body than the first time. I was very sick. They kept me under strict observation at the coronary care unit for 6 or 7 days. This latest illness affected me a lot. I don't feel like myself anymore. I feel powerless and tired from doing simplest tasks. I can't walk like I used to. I want to, but I don't have the energy. So I use the car now to go to everywhere. What can I do? Thank God is all I can say, thank God for sickness and health. I am on regular medications now and I hope this exhaustion goes away. I use the pill that you place under the tongue, it makes me feel better. Last visit the doctor prescribed the patches instead of the pill and it is working too, thank god.	Describing context of first event Experiencing symptoms Calling for help Seeking medical care Receiving diagnosis of MI Undergoing catheterization Feeling frightened of illness Having a second MI Undergoing catheterization Feeling affected by illness Experiencing excessive fatigue Loosing energy Adhering to treatment Listing medication
I: Can you describe your feelings when you knew you have an illness?	
P: I thank God for everything. I didn't feel sad or angry. We have to accept whatever comes from God. I am glad I had a wonderful life and was healthy for so long. I am not young anymore. Each age has its problems, and a decline in health is something commonly seen at my age. I have to live with my illness and adapt myself. What else would I do? It is all predetermined. I know that illness happens for a reason, but as a Muslim believer I also know that nothing happens in this whole world without the permission of God.	Feeling thankful Appreciating life Feeling forced to accept illness
I: Let's get back to before you become unwell, could you please describe your lifestyle or routine in terms of diet, physical activity and smoking?	
P: I used to travel a lot, all the time. Not for pleasure or tourism, it was all work related. I was working at the royal court for more than 20 years. You know very luxurious life. Whether in Riyadh or when we travel abroad. The food is offered all the time. And not any regular food, royal class food.	Working abroad Living a luxurious life Noting negative influence of

1

Commented [AT8]: Interesting!! He quit smoking after the first MI because he was scared. But when the time passed by, he wasn't scared anymore and went back to smoking until he had the second MI. So he believes that smoking caused his second MI and yet he isn't smoke free until now!!

Commented [AT1]: This is similar to KAU19 and KAU07. God's foreknowledge of illness and health doesn't mean that we neglect our health. We have a responsibility toward our wellbeing

Appendix 11 Constructing an initial thematic framework

Constructing an initial thematic framework:

1. Impact of illness:
1.1 Uncertainty about the future
- 1.1.1 Fear of disease progression
- 1.1.2 Uncertainty of living with heart disease
- 1.1.3 Inability to cope with illness

1.2 Social isolation
1.3 Physical and cognitive symptoms
- 1.6.1 Weakness and exhaustion
- 1.6.2 Physical impairment/ constraint

2. Managing and controlling illness
2.1 Accepting illness
2.2 Remaining positive
2.3 Aspiring to normality

3. Socio-cultural norms
3.1 Social expectations
3.2 Significance of traditional food
3.3 Hospitality and welcoming gesture
3.4 Cultural priorities
3.5 Maintaining cultural identity
3.6 Traditional gender roles
3.7 Gender inequality

4. Family and friends influence
4.1 Mutual support from family/friends
4.2 Motivation to adopt healthy lifestyles
4.3 Family's responsibilities/obligations
4.4 Insufficient support from family/friends
4.5 Negative influence from family/friends
4.6 Family's influence on eating habits

5 Socio-economical influence
5.1 Cost
5.2 Financial priorities
5.3 Wealth

6 Environmental impact:
4.1 Neighborhood
4.2 Weather
4.3 Recreational facilities

7 Psychological impact
7.1 Depression
7.2 Tolerance toward unhealthy lifestyles

8 Beliefs and perceptions

1

8.1 Spirituality and religious beliefs
- 8.1.1 Illness predetermination
- 8.1.2 The role of fate
- 8.1.3 Impact of religion on behaviour

8.2 Cultural beliefs
- 8.2.1 Stress level misconception
- 8.2.2 Personal responsibility of health

9 Knowledge and attitudes

9.1 Level of education
9.2 Self efficacy
9.3 Health literacy
- 9.3.1 Lack of awareness
- 9.3.2 Misperception of risk
- 9.3.3 Misinterpretation of symptoms

10 Healthcare services

10.1 Access to services
- 10.1.1 Inadequate coordination of care
- 10.1.2 Limited consultation time
- 10.1.3 Long queue appointment system

10.2 HCP influence
- 10.2.1 Lifestyle advice
- 10.2.2 Professionalism and accessibility
- 10.2.3 Lack of HCP support

11 Governmental/political influence:

11.1 Lack of policy regulation
11.2 Lack of awareness campaigns
11.3 Lack of availability of rehabilitation programs

12 Facilitators to change:

12.1 Strong willpower
12.2 Parental rules and role models
12.3 Improved sense of wellbeing
12.4 Enjoyment
12.5 Fear of disease recurrence

13 Barriers to change

13.1 Lack of time
13.2 Job commitment
13.3 Boredom of healthy food
13.4 Lack of willpower and self discipline